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EDITORIAL NOTES.

A Forecast—The Calorific Standard.

IT has sometimes been felt that there might with advantage be a greater display of enthusiasm on the proprietors' side of the table at the meetings of the Gaslight and Coke Company; but it must be said that the silence of the proprietors, and the perfect unanimity that existed, at the meeting last Friday, were the most eloquent testimony that, in the circumstances, could have been given of the proprietors' confidence in the Governor (Sir Corbet Woodall, D.Sc.) and his colleagues. The proprietors have enjoyed such a long uninterrupted run of improving prosperity under the modern administration and policy, that they fully appreciate that any set-back can only be temporary, and due to abnormal conditions. As it happens, the causes that operated against the Gaslight and Coke Company, and resulted in the past half year ending without the full dividend being earned, are so manifest and so universal that no intelligent proprietor could fail to recognize the unavoidable. It is not by any means the first time that the Company have during, and prior to, the tenure of the chair by Sir Corbet had to dip into the undivided profits in order to level-up the sum that is required for dividend; but history will repeat itself before long by succeeding half years supplementing, instead of trenching upon, the undivided profits. Coal and oil excepted, the half year just closed (as indicated in commenting upon the accounts last week) would not have projected its adverse points so acutely had the second half of 1912 not been such a flourishing one in the matters of gas consumption and the market values of residuals—the increase in gas consumption having in that half year been of a character that had not been witnessed in a similar period for some seventeen years. The Company are in a strong position; and there is no room for any pessimism with an enormous and constantly growing business connection, and reserves of the substantial character that exist as the result of the far-reaching protective policy of the administration.

What is likely to issue from the working in the immediate future is really far more interesting in the circumstances than what has occurred in the immediate irregular past; and the managements of gas undertakings generally, and investors in particular, will be curious to ascertain the most competent views, based on the broadest possible outlook, on the subject. In the Governor's speech, the prospect as he sees it will be found set forth in a nutshell. In the case of the Gaslight and Coke Company, coal will continue to be used, under the current high-priced contracts, the whole of this half year, so that there will be no relief in this respect. Sir Corbet shares the opinions of those who believe that the proper reading of the portents is that the price of coal will not be kept up very much longer—that, in fact, it is already definitely on the down-grade. There will be thankfulness for any small recession; but we rather incline to the view that every possible effort will be made to stem the reflux of prices even to a level compatible with prevailing conditions. We should be quite content if the factors that were real in the fixing of prices were allowed to have fair play, and if they were not supplemented by others of a fictitious and resisting order. Oil is now receding; so that things are much more hopeful for all undertakings having carburetted water-gas plants, and a large stock of coke. An ebbing price for oil ought to have some contributory effect towards easing coal prices. The market value of coke is at present low; and scrutinizing the position carefully, Sir Corbet does not see that there is much chance of any greatly enhanced credit on account of residuals in the current half year. Atmospherical conditions are an uncertain quantity; so that no faithful or dependable prognostication can be made in regard to gas consumption. There may be further economies in working; but it is not anticipated by the Governor that, in the case of the Gaslight and Coke Company, they will go far towards relieving the heavy burdens. The General Manager (Mr. D. Milne Watson) and the Chief Engineer (Mr. Thomas Goulden), however, assured the proprietors at the meeting that they, their staffs, and the men would work strenuously to lighten the burdens of the half year; and they will keep their word. There has been a large measure of working success in recent years; and when the Company are relieved from the enactment which binds them to the dual standards of illuminating power and calorific value, and come under the single standard, there will be a larger opportunity of doing better still. The result of the current half-year's working, however, is likely to find the Company under the necessity of dipping deeper than in the past half year into the undivided balance; and thereafter, it is hoped and believed, there will be a return to more normal conditions. At the present time, there appears to be the fullest justification for thinking that this will be the course of events. Meanwhile, we feel confident that there will be no thought anywhere (where provision has been prudently made against the "rainy days" from which the gas industry, in common with humanity and the whole world's affairs generally, is not exempt) of following any other than the determination of the Gaslight and Coke Company not to raise the price of gas. There we have in brief Sir Corbet's forecast; and it will be very generally accepted as a safe one, and the advice as judicious.

There were two meetings of the Company on Friday; the second being a special one to ratify the movement of the Board to obtain through Parliament release from the illuminating power standard, and to modify the terms of their calorific value clauses, so as to do a very proper part in promoting uniformity in calorific testing and expression—the terms adopted in the draft Bill being those in the South Suburban Act of 1912, which have since been very generally followed. To all intents and purposes, the characteristics of the gas supply of the Company will not be in any way altered. But there is no reason whatever why the Company should be fettered to two standards while all other gas undertakings have only one. Moreover, what is proposed will not in any way injure the small proportion of the consumers who for some minor purpose still require a luminous flame. The illuminating power test has always been a source of trouble; so much depending upon the personal equation. It has indeed been generally held in the industry that the test is a pernicious and unreliable one; and by no one was it assailed with greater vigour in Parliament than by the late Sir George Livesey and the staff of the South Metropolitan Gas Company. That the consumers will not suffer from the Gaslight Company's proposal is evidenced by the fact that, during the strain and stress of the coal strike in 1912, the London County Council relieved the Company from penalty testing for illuminating power, and during that time there was practicaliy nothing to complain about, although the Company were able to work regardless of the luminous power of the gas *per se*. That is all they now ask to be allowed to do; and the experience will appeal to Parliament. True the London County Council are putting themselves in the position to oppose the Bill; but this can only be a pure formality and a protective step, inasmuch as the Company are not asking for anything more than that to which the Council have already been parties in the cases of the South Suburban and the Wandsworth Companies.

An Advantage of Hard Times.

HARD times are not an unmixed evil. Upon some people they have a chastening effect; upon others they have a stimulating effect. They have the latter upon those concerned in the administration and management of gas undertakings, who try, and as a rule very successfully, to minimize the ill-results of times of adversity. We are not altogether sure that their success does not accuse them of a certain amount of laxness in times of good conditions and gratifying

report; but we hope that one result of the present experiences will not be that the coalowners will flatter themselves that the hard times they have been instrumental in inflicting have had a salutary side to them, and so a partial justification. However, the success of gas managements under adverse conditions (which might well be very discouraging) in bringing down the effects to the narrowest possible limits shows an excellent amount of vitality and resolution on the part of administration and officers. The Chairman of the Commercial Gas Company (Mr. W. G. Bradshaw), at the meeting of the proprietors held last Thursday, spoke quite frankly on the subject. All are satisfied with the progress of the concern. But Mr. Bradshaw confesses that, being confronted with circumstances that menaced a good financial showing, the Chief Engineer (Mr. Stanley H. Jones) and those working with him had been casting around to ascertain where fresh economy and higher productive results could be brought to book; and in this they have been successful. So the Chairman philosophically agrees that hard times are not an unmixed evil.

The Company have suffered in common with other gas undertakings in having to pay higher prices for coal and oil, and in receiving less for their residual products. This last half year they were paying 2s. 1½d. more per ton of coal than in the corresponding half of 1913, and 4s. 9d. more per ton than two years ago. What such figures as these mean against any gas undertaking and its customers is easily calculated. To most concerns the first-named figure represents about 2d. per 1000 cubic feet, and the second one nearly 5d.; though the Commercial Gas Company have an advantage in this respect over the majority of gas undertakings, in that they are making, or rather made last half year, an average of 13,726 cubic feet per ton. But these increases in price are an enormous tax on the gas industry generally, and on the part of the community not over-flush in this world's riches who are such large patrons of the industry, as well as on the country's manufacturers, who both for power and heating are also considerable users of coal gas. What the additions to the cost of raw material mean in the aggregate is likewise easily calculable. Reckoning an average increase of only 2s. per ton upon the cost of coal delivered on the works, compared with the corresponding half of 1912, and a consumption of 17 million tons of coal by the statutory and non-statutory concerns of the United Kingdom, we arrive at the enormous additional payment for coal used in gas making of £1,700,000; while, calculating upon a 4s. 9d. per ton difference in cost compared with two years ago, the additional cost of coal per annum for gas making in the United Kingdom would be £4,037,000. These increases per ton in the cost of raw material coming one upon the other, and accompanied by falls in the market values of residuals, are big strains upon a gas undertaking, and are sufficient to be discouraging instead of stimulating. It is to be sincerely hoped that Mr. Bradshaw is right in his surmise that the signs are that the prices of coal will decline. In this he is in agreement with Sir Corbet Woodall. Trade is not so booming now; but home trade and home demand constitute only one factor now in ruling the price of coal. There is the foreign demand to be reckoned with, and that has been on the upgrade; and there is the joint interest of coal owners' pockets and coal miners' earnings resting upon the maintenance of prices.

The higher make of gas per ton of Durham coal is one direction in which the Company have achieved economy. During the big coal strike in 1912, too, necessity compelled the carting of coal from Wapping to Stepney, instead of barging it; and the experience disclosed the fact that water carriage under some circumstances is not so cheap as road transit. The canal has lost this traffic between Wapping and Stepney, and the coal now passes between the two places by road—an incidental advantage being that the Stepney station has now attained an economy in working which puts it on a level with the other works. The position of the coke market has also led to an experiment with coke for steam-raising on the Company's ships; and there again an economy is found compared with bunker coals. All this is to the good, and may be commended to the notice of others for investigation if their own circumstances are such that, in one direction or another, they can make use of the experiences. There is no doubt, too, that if gas undertakings in other quarters can do something to promote a strike among coal porters and carmen (we do not suggest that the Metropolitan Gas Companies did anything of the kind), they will find it an advantage; for the strike in London did an excellent part in energizing the demand for coke, and it is hoped that the good of this will spread and be permanent. The same with gas for heating. Just as "hard "times are not an unmixed evil," so they are "ill-winds "that blow nobody good;" and the Company have, in the early cold weeks of this year (which synchronized with the strike of the coalmen) found both the consumption of gas and of coke ascending, and giving a good start to the business of the year. Oil has descended in price. We only want coal to do the same; and, with the fulfilment of the promise that the markets for residuals will make, at any rate, a partial rebound in values, then we shall see the present eatings into undivided profits stopped, or narrow surpluses converted into the more substantial ones to which gas undertakings are accustomed.

Electricity for Gas-Works Use.

ALTHOUGH electricity is now largely generated and used on gas-works, and the qualifications of gas engineers have to extend to the economical production of electrical energy, it is seldom that the subject is brought before our technical organizations for consideration other than incidentally. Probably the reason for reluctance in bringing forward as a technical topic for open discussion the use of the electric drive on gas-works is that some engineers regard it as an act of transgression against the gas-engine drive. That is a narrow view to take. The fact that the electric drive is adopted shows that the gas engineer is professionally catholic and broad-minded; and that, in such special circumstances as travelling retort-house machinery, the transport of material by the telpher system about the works, and mechanical operation dotted about in different places (instead of being concentrated), there is economy in having a central power generating plant—preferably driven by gas-engines—and distributing energy from that centre. If it was only a question of the adoption of a gas-engine here and there, with machines conveniently grouped, so as to be driven by shafting, then electrical operation would not have, for economical and working reasons, a place in any gas-works. In the circumstances, hearty welcome is given to the paper that Mr. G. Herbert Haynes, of Liverpool, read at last Saturday's meeting of the Manchester Junior Gas Association, and which paper will be found very useful to any gas engineers who intend laying down an electric generating plant.

Given the choice of the two forms of power—steam and electricity—no engineer of a gas-works would to-day think twice of casting his preference for the former, with all its attendant losses; for there is no question as to electricity being, of the two, the ideal form of power in an extensive works with isolated machinery. But where a large amount of steam is required on a works for water-gas production and other purposes, and considering the availability of boiler fuel, one cannot dismiss steam from consideration as being altogether out of the running. It is somewhat hard on the gas-engine that Mr. Haynes should place it in the same category in relation to steam on the score of losses. He declares, early in the paper, that a remark that he has made as to losses with steam driving "applies with *equal* "*force* to those works which have either a moderate-sized "gas-engine driving a long line of shafting, or a multiplicity "of small engines with a *high* loss of efficiency in each." Gas engineers are not in the habit of decrying their own goods; that is one of the secrets of their commercial success. Therefore, we do not like the reference, in relation to gas-engines, to a "high loss of efficiency," as the modern gas-engine, especially the gas-engine driven on town gas, has in these days attained quite respectable thermal and working efficiencies. The recent paper by Mr. W. A. Tookey before the Institution of Mechanical Engineers showed how, in the investigation he had made under actual working conditions, he had found gas-engines operating at excellent efficiency, and many, with little adjustments, were also brought up to a greater perfection. When we come to the competitive points of view, the question of relative reliability as between gas-engines and electric-motors has to be taken into account; and in this the experiences of the insurance companies indicate that the average percentage of breakdowns is greater in the case of the motor than in that of the gas-engine. But Mr. Haynes is considering the question from the point of view of the gas-works, and "JOURNAL" readers know at what he is driving. At the same time, we do not want unnecessarily to give power competitors an opening

to make points in the prosecution of their business without disclosing the circumstances.

Having settled on electricity as being the best form for distributing power about an establishment having such diverse requirements as a large gas-works (although under other circumstances where gas-engines could be economically employed, gas-pipes are a cheap means of distribution power), the question comes in as to the prime mover to be adopted for generating purposes unless energy is going to be obtained from the town electricity system. Very few gas-works take current from town cables, and not always because of the price, but, in view of heavy responsibility resting upon their mechanical operations, the greater reliability of having the generating plant under their own immediate care. Therefore the almost general practice among gas engineers of possessing their own electricity generating plant with the engines and dynamos in duplicate. Mr. Haynes prefers the gas-engine as the prime mover, which is a very natural thing. Indeed, we do not know of any installation of electric generating plant that has been put down purely for gas-works purposes in which anything else but a gas-engine has been used. There may be a few with steam-engines. But it has struck us as rather curious that, in certain cases where the business of electricity supply has been attached to a gas undertaking, the Diesel engine has been adopted, with all its intricacy, loopholes for breakdown, and need for an attendant who is a fully qualified mechanical engineer. The vagaries of the oil market have lately in these cases inflated generating costs in an unpleasant manner; and altogether there is not now such a leaning on the part of electrical engineers towards Diesel engines, in view of the uncertainties they bring in their train. On the contrary, electrical engineers look more graciously to-day on the gas-engine for generating purposes; and we shall, it is expected, hear of developments before long in the utilization of town gas at electricity generating stations.

There are many useful hints in Mr. Haynes's paper that are worth consideration and bearing in mind in laying down an electricity plant on a gas-works. But, in connection with the distribution of the energy, it is very essential to exercise care over the use of bare conductors in positions where an explosive mixture may be formed. There have been certain ugly accidents due to this. It is a good idea to standardize the motors as far as possible, in order to avoid carrying in stock a large assortment of spare parts. But the choice of a motor is very important in view of the characteristics that prevail on a gas-works; and Mr. Haynes did well to emphasize this point. The motor to which he refers as having run 2280 hours without stopping must be an exceptional one; and, in the general interests, it is a pity that he did not put some distinguishing name to it. Regarding the generating costs, a charge of only 5 per cent. for depreciation does not appear sufficient to cover repairs, renewals, and depreciation for a plant including two 40 B.H.P. gas-engines and two 27 k.w. direct-current generators, and doing the work described. The paper, however, is a very useful one. We compliment Mr. Haynes upon it, and for having introduced for open discussion a topic that is to-day of great technical importance on gas-works.

Turbo Exhausters.

THE experiences with large exhausters at the Windsor Street Gas-Works of the Birmingham Corporation have not been, for the Engineer, Mr. J. Foster, the most pleasant; and he has come to the conclusion that their mechanical design is wrong, and their efficiency low. In an article in another column, Mr. Foster explains some of the difficulties experienced, and how he tried to surmount them, with partial success, but disconcerting drawbacks. These were sufficient to induce him to look into the merits of the turbo type of exhauster. But for gas-works purposes the experience has been very limited—the Mariendorf Gas-Works being the only ones (so far as is known) where the new type of plant has been actually tried, though, in connection with coke-oven plants, it has had larger use. However, Mr. Foster becomes a pioneer in large gas-works practice in this country in adopting the turbo exhauster as made by the British Thomson-Houston Company, Limited; and if the present experiences are confirmed by a longer use, the makers of the old forms of large exhausters will have to look well to their laurels. The machine is described in detail and illustrated in Mr. Foster's article; and the description is sufficient to assure of the machine giving a good account of itself. It looks robust; and it is robust. It is free from vibration, and is noiseless. It adapts itself to any load. Its guaranteed steam consumption is rather below that of the ordinary exhauster; and, in five months' experience, the actual steam consumption has been well within the guarantee at any load. The saving in lubricating oil promises to be a substantial one. The ground space occupied is small. The only question is wear and tear; but the wearing parts are such that the upkeep cannot be considerable. It is, of course, only possible to speak of the working of the new turbo-exhauster from Mr. Foster's article; as he is the only town-gas engineer in this country who has yet had any actual experience with the machine. But the favourable account before us is such that there is confidence in saying that he will not be the last.

Exhibitions.

Towards the end of his address to the proprietors of the Commercial Gas Company on Thursday last, the Chairman (Mr. W. G. Bradshaw) paid a handsome tribute to the Chairman (Mr. Charles Carpenter, D.Sc.) and Directors of the South Metropolitan Company for what they did, single-handed, in demonstrating the value of gas for lighting and heating purposes at the Ideal Home Exhibition, as well as of coke heating. There was also a word of regret that greater support had not been forthcoming for Mr. Carpenter's scheme for a gas-lighting display at the Anglo-American Exhibition this year, as well as the promise of material aid from the Directors of the Commercial Company if the scheme was revived.

An Institution Junior Paper.

Special interest will be taken in an announcement made at the South Suburban Gas-Works last Saturday by the President of the London and Southern District Junior Gas Association, to the effect that Mr. Edward Allen, the President of the Institution of Gas Engineers, has issued an invitation to the English Junior Gas Associations for one among their members to read a paper at the annual meeting which is to take place in Liverpool next June. To whichever Association may fall the privilege of supplying the reader of the paper, we are sure the whole of the Juniors will greatly appreciate the honour that has been done them; and we look with a considerable amount of confidence to a good contribution being the result of this indirect form of "recognition." It may be pointed out that something in the way of an account of research work, or a comparison of systems, is what is wished for, and not a description of plant. If advantage is to be taken of the offer, there is no time to be lost.

Coke Selling.

The "Bulletin" of the British Commercial Gas Association this month is in the main dedicated to coke, and it makes excellent and useful reading. We are glad to see the Association setting out in this new branch of work; for there is a closer association between gas and coke, through custom for them being both domestic and industrial for heating purposes, than there is between gas and any other residual the gas industry trades in. There is gratification, in an article by "F. W. G." that the recent cold weather and the London coal porters' strike have together helped to ease things a bit in the Metropolis. But we are afraid that the big strike in the London building trade will do something to delay the consumption of coke in certain industrial quarters; and this will act as an unwelcome set-off to the good influences of the cold weather and the strike.

Tar Committee.

In the same article, "F. W. G." suggests that a subject that might well be considered by the General Committee is as to whether the establishment of a Coke Committee in connection with the Association should not be followed by one dealing with the question of developing the sale of tar. The question of the formation of an independent Tar Committee was first raised by the "Iron and Coal Trades Review" last December; and, in discussing the proposal on Dec. 16, we suggested that in view of the tar producers being sulphate of ammonia producers, the Sulphate of Ammonia Committee might look into the question of broadening their work. We do not desire to do anything to damp

the ardour of the active spirits of the British Commercial Gas Association; but tar is hardly a subject for that body to deal with. In present circumstances, they had better restrict themselves to the cultivation and protection of the markets for gas and coke. "F. W. G." is, however, apparently encouraging the notion that the Coke Committee might be followed by one for tar. In referring, however, to sulphate of ammonia, he gives a very good reason why a Tar Committee should be left for (say) the Sulphate of Ammonia Committee to look after. He says: "The work of the Sulphate of Ammonia Committee is so closely allied to, that it might really be combined with, ours, but for the fact that other interests than those of the gas industry are represented on that Committee—those of the shale oil and coke-oven trade for example." This being so, wherein is tar differently situated. The British Commercial Gas Association could not work for the benefit of the tar business of the gas-supply industry without contributing to the benefit of producers outside the industry; and all producers should subscribe to the cost of the work. There is also the other reason, as to gas and coke being a sufficient field for the British Commercial Gas Association.

Modern Conditions and Titles.

There were several features about the proceedings at last Saturday's meeting of the Tottenham District Light, Heat, and Power Company, which are of interest. The first is the change in the title of the Company, which arises from the fact that the Company are now the statutory electric light suppliers in Wood Green, and they are out to do business wherever they can in light, heat, and power. What is there in a name? There is much in some cases; and the alteration in the title of the Tottenham Company is significant of the change that has come over the gas industry, and of that which is coming. There are a large number of companies prosecuting a big business in gas for purposes other than lighting who operate under the names that the long-ago predecessors of the present administrators gave them. "The Gas Light and Coke Company" is the style of the largest Gas Company in existence; it is the title, with the distinction of the name of a town before it, of many other gas companies. But it is a title that is too narrow to-day, and is not expressive of the business done. But appellations of statutory companies cannot be altered without sanction from Westminster. We should like to say more about the out-of-date names of many companies; but, in turn, some of our readers might have a peg at us. The registered title of the "JOURNAL" is the "JOURNAL OF GAS LIGHTING" with a long appendix, and it is the title by which the oldest paper devoted to the service of the gas industry has always been known—that is, for sixty-six years. We are loth to part with the name for old association's sake, though the paper is equally well known the world over as the "GAS JOURNAL"—wherever gas is made and distributed, or wherever coke is the primary product of coal carbonization, or wherever the chemical industry comes in touch with the gas or coke-oven industries. But to-day the contents of the "JOURNAL" show how incomprehensive and erroneous is the registered title. This, however, is a case in which the name does not matter much, so long as the contents of the paper give readers a full survey of the main topics in which they are concerned—whether technically, commercially, or financially. We have often considered the question of imparting a more modern touch to the title; but the old one survives discussion.

Automatic Lighters and a Public Contract.

In his address at the Tottenham meeting, Sir Corbet Woodall referred to a remarkable effect of automatic lighting and extinguishing upon the expenses attaching to public lighting. On the expenditure side of the half-year's revenue account, public lamps have only been responsible for an outlay of £1331 for lighting and repairing, as compared with £2425 in the corresponding half of 1912. The district is an extensive one; and, considering this, the charge for the past half year compared with former periods seems to be a ridiculously low one. Dividing the charge (which includes depreciation on the automatic lighters) by the number of street-lamps, the result is 5s. 6d. per lamp for the half year; and this takes no account of the gas saved. It would be interesting to work out how this contrasts with other districts. Public lighting demands in the present the exercise of the utmost economy; for the competition is getting more strenuous. On this point, Sir Corbet says: "Owing to the use of these automatic lighters, we have been able to reduce the price of gas for public lighting to the benefit of the ratepayers, and have succeeded in securing a contract with the Tottenham Council for a period of ten years." This long-period contract was obtained by excellence and economy in public lighting.

Pension Fund.

The employees of the same Company are extremely happy over the position they occupy both in connection with co-partnership and the newly launched pension fund. Owing to the rapid reductions of the price of gas (it is now 2s. per 1000 cubic feet), the employees are receiving a bonus on salaries and wages of 9 per cent.; so that there is plenty of room for working a pension fund in conjunction with the co-partnership scheme. The members contribute to the pension fund 3 or 4 per cent. on salaries or wages, according to age at entry; the Company contributing a sum equal to the members. At the men's request, two-thirds of the amount payable by them is charged to the withdrawable part of their co-partnership bonus—the remaining third being paid in cash. The pension provided by the fund is one-sixtieth of the member's salary or wages on retirement for each year of service, with a maximum of forty-sixtieths, or two-thirds—the pension age being 65 years. In other words, a man at 65 who has been forty years with the Company will receive a pension for life of two-thirds of his salary or wages at retirement. To existing co-partners, the matter was left quite optional; but their appreciation is attested by the statement that 98 per cent. of them have joined the fund. The Tottenham men (the Enfield ones are included) evidently know a good thing when they see it.

Fancy Goes a Long Way.

It is worth noting, as an illustration of the large part that imagination plays in our daily life, that, although the mains have not yet been connected up between the Tottenham and Enfield areas, and the *status quo* has been maintained, and will be for some few weeks yet, the Company have, on the one hand, been greatly complimented over the improvement of the supply in the Enfield area, and, on the other hand, have received complaints as to its deterioration. However, the chimera that, at any rate, is found in the latter will completely fade away as the effects are felt of lower prices and the advantages of being consumers of the commodities of a more powerful Company, and a Company possessing greater resources. Those who have given form to complaint on the products of imagination will then join forces with those who have already tendered their congratulations.

The Growth of Co-Partnership.

Intimation is made in the news columns of to-day's issue of the addition of another name to the already substantial list of co-partnership gas undertakings; and the hope may be expressed here that this will lead to further accessions on the part of those who have so far remained outside the movement. The Redhill Gas Company's scheme, it will be admitted, is well calculated to secure the objects sought by its introduction—namely, to give all the employees an inducement beyond their salaries and wages to take an interest in their work and in the welfare of the Company, and (by affording them an opportunity to become stockholders) to permanently improve their position in life. The Company is a sliding-scale one, and the bonus is arranged on the same lines—with a more generous percentage when the price gets below a certain figure. For the first five years, the bonus will be entirely in stock; and after this one-half will be in stock, and the other half will accumulate at interest. There are some desirable restrictions placed upon withdrawal, so that the men may not be easily tempted to waste the money; and all co-partners will sign an agreement. The employees will very soon find themselves property owners; for though the Board have only quite recently adopted the principle, each co-partner will on June 30 next (if he has been in the Company's regular employ for twelve months at that date) be credited with a full year's bonus.

Motor Fuels from Gas-Works.

We are inclined to think that Dr. W. R. Ormandy, at the Society of Arts last week, in discussing the question of the sources of motor fuels, fairly well represented the position of town-gas works in the matter of contribution, though some of his other views

could well be challenged. We do not believe the stripping of town gas for the purpose of supplying motor fuels is ever likely to become a practical proposition, unless some unforeseen radical change takes place; for there is not much sense in spending (say) 2d. for the purpose of obtaining a doubtful 2d. in revenue. But Dr. Ormandy is also of opinion that no great trust can be placed in coke-oven plants to help to relieve the situation in regard to the demand for motor fuels, in view of the facts that gas suppliers are looking to the use of part of the coke-oven gas production for town use, and that the demand for metallurgical coke is limited and variable. Low-temperature carbonization he regards as altogether too flimsy a proposition, seeing that the production of oil spirits will depend upon the attitude of the public towards the use of the par-carbonized coal—a use that gas and gas coke are so strongly assailing. Altogether, the paper (from which extracts are reproduced this week) does not do anything to buoy-up the hope of those interested in motor fuels of getting substantial relief from the high prices of petrol that have been for some time past and are now ruling. But if the coal carbonization industries cannot meet the entire demand for motor fuels, they can do something towards easing the position to the extent of their capacity for producing motor spirit. Dr. Ormandy is on the side of the alcoholists; and he naturally examines (and that favourably) the position from their point ot view. Another thing he predicts is that the demand for oil will outstrip the rate of fresh development of wells and other sources of supply. This is the opinion of Professor Vivian B. Lewes; and it is an opinion that oil users wish it were possible to dismiss as being ill-founded.

Public Interest in Municipal Affairs.

Attention has frequently been drawn in many quarters to the lack of interest shown by ratepayers generally in the doings of their local governing authorities, though it is true one sometimes notices complaints by them of high rates and shortcomings on the part of their representatives. It is natural, of course, that the malcontents should display more activity than those who are content; and this, in a way, is unfortunate, because it is apt to lead at times to incorrect results. The recent case (recorded in another column) of the poll at Leeds, regarding a section of the Corporation Bill designed to permit of a supply of water being furnished to Doncaster, affords an illustration of a disappointing attitude of ratepayers on matters which are really of serious importance to them. Here, out of close upon 100,000 eligible ratepayers, something under 10,000 trouble to go to the poll. Ten per cent. voting on a matter in which all should take an interest! And the result has been the rejection of the scheme—not, of course, by the ratepayers of Leeds, but by a very small section of them. There is probably much truth in the theory advanced that, while the opponents polled almost to a man, the omission to vote was on the part of those who favoured the scheme, or, at all events, who were content to leave the decision in the hands of the Council. And if this is the right explanation, it affords poor encouragement to those councillors who are spending much time and much effort in promoting the welfare of the city. While not wishing to pronounce either for or against the particular scheme now in question, one may urge that, if ratepayers are ready to find fault with the actions, and what they may consider may be the results of the actions, of their representatives, they should be at least equally ready to encourage what they find no reason to condemn. The Leeds scheme, we are assured, will be introduced again by means of a new Bill; and it is to be hoped on that occasion the 100,000 eligible ratepayers (should a poll be necessary) will display a greater sense of their duty as citizens than they have done in connection with the present clauses. The suggestion that disgusted strikers have been responsible for the throwing-out of the scheme, helps to show the need for a real rousing of the ratepayers.

PERSONAL.

The Directors of the Leslie (N.B.) Gas Company appointed Mr. A. Mitchell, of Kettle, as Manager; but the Directors at Kettle promptly raised Mr. Mitchell's salary, and now Leslie has appointed Mr. JOHN DOULL, the assistant at Kelty, to take charge of the works.

Mr. RUFUS ELLIS has been appointed Manager of the Birstall District Council's Gas-Works. Mr. Ellis has been associated with the works for more than twelve years, and has acted when necessary as temporary manager. He commenced work there as a boy. He holds the City and Guilds of London certificate in "Gas Manufacture," and the Dewsbury Technical School's certificate for chemistry.

We are pleased to learn from the current number of the "Co-Partnership Journal" of the South Metropolitan Gas Company, that Mr. C. J. DICKENSON GAIR, of Vauxhall, has been elected a Fellow of the Chemical Society. The Editor of the above-named publication, referring to the matter, said: "Mr. Gair has been for many years in charge of the chemical laboratory at Vauxhall, and his work there has shown him to be possessed of scientific knowledge and ability which deserve the recognition he has now received."

OBITUARY.

The death is announced, as having taken place on the 21st ult., of Mr. CHARLES PRICHARD, of Lynn, Massachusetts, one of the Past-Presidents of the American Gas Institute.

An Italian paper which came to hand yesterday contained the news of the death in Rome, early last week, of Rag. ERNESTO SANNA, the Manager of the municipal gas and water works at Cagliàri.

The Gas Committee of the Burley-in-Wharfedale Urban District Council have lost their Chairman, through the death last week of Mr. CHARLES CROFT. Deceased, who was 63 years of age, had been ailing for some months; but his death took place with painful suddenness, his wife finding him dead in his chair on Tuesday morning, with a chess-board and men in front of him.

We have only just heard of the death, on Dec. 26, of Mr. W. POPPLEWELL BLOXAM, at the early age of 53. Mr. Bloxam will be remembered as having at one time held the appointment of "Scientific Adviser" to the Sulphate of Ammonia Committee. Mr. Bloxam's first appointment was at the Royal Naval College, Greenwich, where he was for twelve years demonstrator in the Chemical Laboratory. Later, he undertook research work at the College of Physicians and Surgeons, and in 1901 was sent to the Presidency College, Madras, as Professor of Chemistry. Afterwards he proceeded to the North of India to investigate the cultivation and production of indigo at the Dalsingh Serai Research Laboratory; and two years later returned to England and was sent by the India Office to continue his researches (in conjunction with Professor Perkin) at Leeds University, where he stayed for three years before coming to London to the Sulphate of Ammonia Committee.

Association of Consulting Engineers.

The inaugural dinner of the Association of Consulting Engineers was held at the Whitehall Club, Princes Street, Westminster, on Monday of last week, under the presidency of Mr. G. Midgley Taylor, Chairman of the Committee of the Association. Among the toasts, may be mentioned that of "The Association of Consulting Engineers," which was proposed by Mr. J. H. Balfour Browne, K.C., who said that the Association were doing good work, both for themselves and for the public, in keeping up the standard of the profession; and that of "The Guests," submitted by Mr. H. Percy Boulnois, with the remark that the Association had been charged with being a trade union and a purity party, and he did not object to either. It was, Mr. Boulnois added, very necessary that the consulting engineer and expert witness should be beyond suspicion. They had many precedents for what they had done. Both the legal and medical professions had their trade unions; and even the House of Commons was a society of the same kind. Acknowledgment of the services rendered by Mr. A. H. Dykes was made by Mr. James Swinburne, in proposing "The Hon. Secretary and Hon. Treasurer of the Association."

Early Days of Coal Gas.—In their page of "Engineering Notes" last week, the "Daily Telegraph" wrote: In these days of coal gas, it is difficult to realize how keenly the introduction of gas lighting was combated a century or so ago. We are reminded of this by the perusal of a copy of the "Morning Chronicle" of March 23, 1808, in which there occurs the following interesting passage: "It having been rumoured that a petition to Parliament will shortly be presented to render the use of gas lights universal, Mr. Hyde respectfully informs the legislators of this Empire that he will this evening submit to their inspection the properties of the carburetted hydrogen gas, and demonstrate by the most unerring experiments the evils that must inevitably result from the introduction of gas lights." The same Mr. Hyde also announced that, at 22, Piccadilly, he would give "an exposition of gas lights in which insalubrity of the carbonated hydrogen gas, and the fallacy of the pretended inventor's assertions, will be proved by the most unerring and conclusive experiments;" and he naively added: "The whole will be concluded with a beautiful selection of philosophical fireworks produced by hydrogen gas." It is difficult to imagine what would be Mr. Hyde's remarks if to-day he could look upon a modern 4000-candle power high-pressure gas-lamp.

ANOTHER GAS PROSPECTUS.

East Pembrokeshire Gaslight and Coke Company, Limited.

We are not fascinated by, and are not going to recommend, for favourable consideration, the prospectus of the East Pembrokeshire Gaslight and Coke Company, Limited, through which prospectus the public are invited to buy something in the nature of a "pig in a poke." It is one of the promotions of the United Gas-Works Development Company, Ltd., whose abortive Somerset and Gloucester Gaslight and Coke Company we did not like. Some of those who parted with money for that concern were exceedingly glad to get it back again; but those people who made application have now received notification from the Secretary of the East Pembrokeshire Company (who occupy an office or offices, or a desk, at the same address as the United Gas-Works Development Company, at No. 14, Victoria Street, S.W.) that they are entitled to a preferential allotment of shares, and suggesting the advisability of making early application, as "after the lists are open to the public, preferential allotment could not be guaranteed." This solicitude for the disappointed applicants for shares in the short-lived Somerset Company invites respectful sympathy, which we find it hard to confer, because there are a few points about the prospectus that those considering application should investigate. In the contracts we notice the name of Frederick Colman bulking largely. He occupies divers positions in connection with this promotion. On the one hand, as a Director of the United Gas-Works Development Company, Limited, he is interested in the flotation; on the other hand, as Trustee and one of the Directors of the East Pembrokeshire Company, he is further doubly interested. We have no acquaintance with Mr. Colman. There is another Director who is regarded as a highly valuable acquisition. He may be, for aught we happen to know. Mr. J. M. Rainsford is his name; and it is stated that he has been "associated for upwards of forty years with the largest London and suburban gas amalgamations." It does not say in what capacity Mr. Rainsford has been so associated. But at any rate it stands to our shame and discredit that we should have been unacquainted with, and utterly oblivious to the existence of, a gentleman who for upwards of forty years has been associated with the largest London and suburban gas amalgamations. We should like Mr. Rainsford to send a list of the amalgamations with which he has been associated, so that we may add to the lustre of that association by extending the intelligence in our columns. Sir George William Kekewich, K.C.B., D.C.L., and J.P., and Mr. F. C. Murray, M.Inst.C.E., are also on the Board. The Consulting Engineer to the new East Pembrokeshire Gas Company is Mr. George A. Smith, C.E., described as a "Consulting Gas Engineer." We do not find the name in the membership list of the Institution of Civil Engineers; and we do not know it as that of a recognized "consulting gas engineer."

The nucleus of the business of this new Company, which takes its high-sounding name from the eastern part of a county, is situated at Narberth—the works being old-established and freehold. To be exact, they have had a life of forty years. During their life, they have not expanded with noticeable vigour. Mr. J. H. Silcox has been pleased to part with the works, freehold, and business for £1250; and the Development Company in turn parts with them for £1500, and there is to be 7½ per cent. commission handed over to them for underwriting £5000 of capital. The preliminary expenses up to the time of allotment (exclusive of underwriting commission) have been fixed at £1500. The Development Company, having agreed to provide the preliminary expenses, are to be refunded this amount, together with 150 fully-paid preference shares, and 150 ordinary shares. It is proposed that the capital shall be £20,000—equally divided into 7—seven!—per cent. preference shares, and ordinary shares of £5 each. As a bait, the promoters guarantee the 7 per cent. dividend on the preference shares, and 8 per cent. on the ordinary shares, for *one year*. A second bait is that as the Company are only registered under the Limited Liability Acts, and are not governed by a Special Act of Parliament (which investors usually consider to be a good thing), the dividend on the ordinary shares is unlimited. The prospectus shows how the shares and stocks of a number of gas undertakings have very largely appreciated; but unfortunately for the promoters of this new concern, the companies quoted are working under statutory authority. Investors will note that works carried on as these East Pembrokeshire ones are not in a very certain position in regard to the opening up of roads and so forth for carrying on their business. Although the original vendor only got £1250 for the works, Mr. Smith, "C.E., Consulting Gas Engineer," estimates that, when the extensions of the distribution system are carried out, there will be a net profit of £3042 3s. 7d.; the price of gas being 4s. 6d. He is a remarkably good calculator who can work out an estimate under the conditions existing at Narberth, and under conditions very much prospective, to the point of odd pence. The estimated consumption of gas being 24½ million cubic feet, the profit is equal to about 2s. 6d. per 1000 cubic feet! A further simple calculation shows that this sum will allow of the payment of 7 per cent. on the preference shares and 14 per cent. on the ordinary shares, with a balance to the good. This is all surmise, and no better term can be found for it. Once before we told the United Gas-Works Development Company that, before there could be commendation on our part of their schemes, they would have to be investigated by a Consulting Gas Engineer who is recognized as such by the gas industry. We do not know Mr. Smith. He may honestly believe in his own published computations; but we are not disposed to accept them, with our knowledge of what can be and is done in rural areas, unless endorsed by someone whom we know, and, knowing, believe in, as a consulting gas engineer.

ELECTRICITY SUPPLY MEMORANDA.

The new half-watt lamp is receiving, from central station engineers, a large demand for experimental purposes; and so many gas engineers have doubtless had an opportunity of seeing the new high-power rival with which they have to contend, and which before they saw the lamp in the "flesh," and had their optical members upset by the eye-torturing glare, was the subject of comment in the "Memoranda" and leader columns. Some of our electrical friends are bent on making as big an impression as possible with the lamp by exposing it to view in all its nakedness, and thus flying in the face of the prudent advice that has been tendered them as to shielding the eyes of the public from the enormously high intrinsic brilliancy. If lamps of this kind are used in our public ways, something ought to be done by the authorities to compel the shielding of the highly incandescent fine filaments. One evening, early last week, it was noticed that outside the Ediswan place in Queen Victoria Street, a half-watt lamp was fixed just above a hoarding round the doorway, without shielding of any kind. The result was that as pedestrians got into proximity to the lamp there was an involuntary movement of the eyelids, occasioned by the insistence of the eyes for protection. Just by Blackfriars Bridge, there are shops exposing naked half-watt lamps. People who put offensive and injurious lights in public places—lights with an outrageously high intrinsic brilliancy—ought to be brought to book just as anyone else would be who committed a nuisance in a public thoroughfare. It comes to this, if the exposure of such high intrinsic brilliancy lamps is to be allowed, then people will have to walk about at night time wearing tinted glasses, or else eye shields or blinkers. It would be more in accord with the fitness of things, and with personal comfort and appearance, for the shielding to be done at the lamps. Hard by the Mansion House Station, at the General Electric Company's business premises, there are four of the lamps inside the windows; but the Company have had the decency to shield them by semi-indirect fittings. But even then there is a strong glare from the translucent protection.

Involuntary Blinking.

The Half-Watt Lamp Envelope.

The new lamp having an intrinsic brilliancy eight times that of the ordinary metallic filament lamp has set the makers to work producing protecting fittings for them for outdoor use. Protection is needed, not only on account of the high intrinsic brilliancy, but owing to the intense heat of the bulb of the lamp, which will not stand exposure in inclement weather. The fittings are therefore being made with a special scheme of ventilation, in order to keep the enclosed lamps as cool as possible. Siemens Bros. have produced one form of lamp casing, with opalescent globe, which, complete, looks much like an ordinary low-pressure high-power gas-lamp for shop purposes. These outer casings will give the lamps a very heavy appearance. The casings are manufactured in three sizes. The first is suitable for 600 and 1000 candle power half-watt lamps, and is 14½ in. diameter by 24 in. long. The second is suitable for 1000 and 2000 candle power half-watt lamps, and is 18 in. diameter by 28 in. long. The third is for the 3000-candle power lamps, and is 22½ in. in diameter by 30 in. long. The Wardle Engineering Company are making another form of casing, which is rather novel. There is the top casing much the same in form as an arc lamp top. Covering the globe of the metallic filament lamp is a dome-shaped reflector, and suspended below the lamp is an opal conical reflector, with the apex pointing to the lamp. The filament of the lamp is not below the rim of the top reflector; but nevertheless when the lamp is hung up the filament will be visible to the eye. However, it is claimed that the horizontal rays are reflected from the interior of the reflector back again at the desired angle; the upper and the lower rays being reflected at a similar angle from the opal conical reflector. The rush to produce protecting casings for half-watt lamps is eloquent of the views at any rate of some of the makers as to the immediate and imperative necessity for them.

Visions.

A candid speaker on matters electrical is Mr. J. W. Beauchamp, the Engineer of the West Ham Corporation Electricity Department, and he is not only candid, but he has an excellent imagination, the products of which do not necessarily coincide with the futurist pictures drawn by other people. At the recent dinner of the staff of the department, Mr. Beauchamp referred to the introduction of the half-watt lamp; and he rather thinks that it will force electrical engineers to realize that the supply of electricity for lighting must sooner or later attain the nature of a by-product. There was confession that the lighting load in West Ham is comparatively small; and there were comments which

indicated that something wonderful would have to be done in the borough to obtain compensation, if half-watt lamps were put on the market in small candle powers. It would require 500 electric vehicles charging day and night to bring in the revenue displaced, or 2000 private houses would have to adopt electric cooking. This reference to cooking made our friend dilate a bit on this subject; and he presented his hearers with a rather quixotic proposal, which somewhat reminds of the method of cooking on Sundays at the village baker's. Kind soul that he is, the baker, for a small consideration per householder, foregoes the privilege of attending church or chapel; and, while those who are scrupulous as to their public devotions are in church or chapel, he cooks their dinners in bulk. Mr. Beauchamp (like Mr. Seabrook) is of opinion that very reasonable tariffs will have to be adopted in order to get electric cooking into private houses. He pointed to what has been done in the case of restaurants, and attributed their "success" with electric cooking to the fact that the capital outlay is spread over a large number of meals, and in this way the cost is more quickly recovered. He forgot to mention that most of the restaurants that have taken on this additional risk are in close, if not direct, connection with the local electricity departments, and receive as much nursing as a baby born with a silver spoon in its mouth. Another reason for the "success" is that the apparatus is worked at a higher duty than is possible in domestic service. With all the advantages of the restaurant, we have heard a few reports to the effect that the "success" of which there is public notification is not altogether untarnished, and there are such things as meters kept under lock and key to protect them from prying eyes. In the case of the dwelling-house, even when the apparatus can be hired, the cost of the incidental wiring is spread over a comparatively limited number of meals, and so is the rental. With the restaurant, too, the cooking load factor is high. Mr. Beauchamp went on to suggest that it might be possible to help the solution of the problem by the introduction of co-operative cookery. In this way the housewife would be spared a great deal of the drudgery and the waste that results from the present individual system of cooking. If the cooking could be done for groups instead of for individuals, Mr. Beauchamp thinks it would be better. We are not there yet.

The Tariff Question.

The point made by Mr. Beauchamp as to the reasonable charge being necessary for cooking and heating purposes, was, as indicated, one upon which Mr. Seabrook had something to say at the last meeting of the Point-Fives Association, as noticed last week. He is confident that under the system of a primary charge for current (based on the rateable value of premises) for household use, the secondary charge (where the undertaking can afford it) must not be higher than ½d. per unit, for competitive purposes in the cooking and heating business. The rateable value system is considered an absolute essential to the progress of cooking and heating; but, as we have before pointed out, the system itself is likely to limit the adoption of electrical working, even assuming the initial cost of apparatus, maintenance, and the over-all efficiency were all that could be desired. The number of people in a community is limited who can afford the primary lump sum or who will venture to have such a sum added to their present obligations—whether the primary charge be based on a high percentage or a low percentage of the rateable value. The "Electrician" appears to have somewhat belatedly come to very much the same conclusion. It says:

> Looking at the question from the consumer's point of view, it must be remembered that a high primary charge kills the business, and likewise, unfortunately, a high secondary charge kills it equally. We are quite sure that a great deal of harm is done by those tariffs which, on account of simplicity, seek to impose a high primary charge upon the consumer. No consumer will adopt electric heating and cooking on a large scale at first. He will try it first on a small scale in competition with other methods; and if he has to pay a high primary charge, he will feel that the price per unit comes out so high for limited requirements that he does not think it worth while to make a start. On the other hand, it is useless to imagine that a high secondary charge with a low primary charge will carry an undertaking very far, for the simple reason that the domestic consumer who uses electric energy for cooking and other purposes may require a considerable amount of energy, and here again competitive prices become essential. Nor does a simple flat-rate meet the case. In order that the greatest progress should be made, we think that tariffs should be as elastic as possible; and although it is undesirable to have an endless variety of tariffs, we think there certainly should be sufficient alternatives to encourage the consumer who wishes to start in a small way as well as to encourage the class that is prepared to take large quantities of energy.

There is a good deal of thinking about this; but it expresses what other people have thought. The most obvious thing is that the question of tariffs, in relation to current circumstances, is in as great a muddle as ever.

A Resuscitating Corps.

For a long time past professors who may know something of the subject, and others who profess to know something of it but of a surety do not, have had much to say about the saving of life that there might be if persons who receive an electric shock had immediate attention. But from the reported fatalities, there does not appear to be any lessening of the number of persons who die after receiving electric shocks; and the evidence of death resulting from voltages of a low as well as a high order continues to expand. If anything could be done more than is done at present, surely the Government Departments controlling electricity supply would see to it that steps were taken to secure application. A correspondent of the "Daily Telegraph," writing from Winnipeg, states that last year the Electric Workers' Union there had 66 members fatally shocked, or more than twice as many as in 1910; and he firmly believes that had proper means of resuscitation been adopted, the unfortunate victims would have been brought back to life. However, the correspondent has not himself, though he has given consideration to the subject, anything very effective in the way of suggestion to advance in connection with it. He thinks that the various engineering colleges and universities should have embodied in their curricula of electrical engineering a thorough course of instruction in the various methods of resuscitation. That is all right so far as it goes; and we hope that by this time the idea has been already matured. It is also suggested that all cities should have a central committee composed of good first-aid men of the medical and electrical professions, who could always be reached by telephone or other means, so that two or three of the members could repair immediately to the scene of an accident. There does not seem to be anything very brainy about the suggestion. A permanently available committee would cost money—but the necessity for such a committee is surely rather a striking testimony to the "safety" of electricity.

Death at Low Voltages.

A few instances of fatalities through electric shock will illustrate the necessity for, if possible, something more being done to protect men's lives. Recent fatalities reported on have nearly all been at low voltages—well within the domestic range. There is the case of a banksman, named Walker, who was killed on Jan. 16 at the Digby Colliery, Kimberley, which is supplied with alternating current, at 110 volts, by the Derbyshire and Nottinghamshire Power Company. The man merely came in contact with a bare place on the lighting system. A man named Bradley, towards the end of last year, was killed at the works of Messrs. Mawson, Clark, and Co., at Dunston-on-Tyne, owing to a shock received from a hand lamp (250 volts). He was found grasping the metal work of the lamp with both hands. Another case of shock through a hand lamp occurred at the works of Messrs. William Bayliss, Limited, which firm were subsequently fined £55 and costs for failing to comply with certain of the Home Office regulations. A man named Faraday, working in the garage of the factory received a shock from the lamp, and could not for a time get released from it. Those who attempted to relieve him from his awkward and unpleasant situation also received shocks. A boy named Dunning lately met with his death at a colliery at Grimethorpe, near Barnsley, through touching a live electric wire. A very singular case is that of George Barton, of Hyde, who, while working at the Cheshire Cheese Hotel, Gee Cross, received a shock through grasping the cellar-door handle, the rear part of the latch of which pierced the wood casing of an electric wire, and came in contact with the latter (220 volts). James Waugh, a fireman, at No. 3 Broomrigg Colliery, of the Banknock Coal Company, also died through receiving a shock from an electric cable. A coal-cutter appears to have been installed in a wet place. One of the three phases on the coal-cutter itself was earthed, apparently through moisture causing sparking from the terminal to the frame of the coal-cutter. There was another leak almost opposite where the body was found. The hypothesis is that the cable was, in consequence of these defects, made alive when the deceased was handling it. The "Electrical Times" might reprint this paragraph among its model copy for Electric Supply Publicity. The facts would be nearer the mark than a romantic statement written and printed in an ancient Hygiene Manual by Dr. E. A. Parkes, M.D., F.R.S., of which statement Dr. Parkes himself lived to see the folly. Cannot "Meteor" get something modern and reliable for his paper on the subject of atmospheric pollution by gas, and as to the injury that it is supposed by electricians to cause—something that applies to the conditions of to-day, and not something written in a past age when even "M.D.'s" and "F.R.S.'s" were occasionally prone to adopt traditional sayings without putting them to scientific test. We can question these things with assurance. There is no question about death being possible at voltages within the range of domestic electricity supply. The numerous poor fellows who are in their graves to-day as a consequence of electric shock bear fearful testimony to that.

The Runaways.

In the editorial columns a fortnight ago, we dealt with the "F.I.C.," whom "Meteor" of the "Electrical Times" had retained for the purpose of assisting him out of the stupid position into which he had placed himself by intervening in a matter about which he innocently divulged the fact that he did not know anything. The best reply that "Meteor" can make is this:

> Do what we will, we cannot please the "JOURNAL OF GAS LIGHTING." We quoted the "Lancet's" strictures as to "The Bane of Sulphur in the Gas Supply," and the "JOURNAL" challenged us to substantiate our comments. During the few weeks that we omitted to comply, we had to writhe under implications of cowardice and falsehood. We then published an article on the subject by "F.I.C.," a chemical expert, hoping that this attention on our part would be appreciated. But no! We read that "Meteor" manifestly got out of his depth, and so had to call in help. And of "F.I.C." we read that he is a broken reed, that his own arguments tell against him, that he knows

nothing of air purity and ventilation, he has strayed outside his bounds, and that his reason for withholding his name is not such as we alleged. We shall really have to give up the controversy, for there is no possibility of parrying arguments of this nature. Lately, moreover, we have begun to suspect that it would be ungallant to do so. We would not argue *ad hominem* if we could; but perhaps we couldn't?

So it has come to this, that "Meteor" cannot justify his position; and our description of "F.I.C." has evidently had to be accepted by our meteoric friend as correct. Otherwise "F.I.C." would have tried to, at any rate, take the edge off our criticism, even if he could not utterly destroy it. "Meteor" never can find room in his columns for criticisms such as those we made, and on this occasion, our electrical readers will observe that he slinks off with the words: "We shall really have to give up the controversy, for there is no possibility of parrying arguments of this nature." There were arguments and figures of another nature in our article about which "Meteor" is absolutely silent. That is not strange. But do try "Meteor" to energize "F.I.C." into giving us a little more, and into showing greater courage. Your attitude over these matters cannot look well in the eyes of other electrical men.

NOTES FROM ABROAD.

Natural Gas in Canada.

Quite suddenly last week natural gas was discovered in the very heart of Toronto. A well, 1000 feet deep, was being bored near one of the main city streets, when it was suddenly filled with natural gas. This was accidentally ignited, and a serious explosion followed, which shattered the massive new building of the Dominion Bank. Great surprise is expressed at the discovery, in this somewhat alarming manner, of natural gas, as hitherto none had ever been suspected in the neighbourhood.

Gasholders as Aerial Signposts.

It may be remembered that at the meeting of the "Société Technique" last June the question was raised of painting signs on gasholders for the guidance of aircraft in peace and war. The matter has been taken up by the Société, together with the National Aërial League of France and the Minister of Public Works, and there are now thirty-one gasholders in the country inscribed with large figures indicating the longitude and latitude, so arranged that it is easy to distinguish which is which. The figures vary in size, and in one instance (at Rheims) are as much as 32 feet high. In every case they can be read at a distance of 2 kilometres—that is, over a mile.

High-Pressure Gas in the United States.

A correspondent of the "American Gaslight Journal" states that, having secured a private right-of-way in Holland (Mich.) for a high-pressure main, the interests identified with the American Public Utilities Company, of which the Holland City Gas Company is a subsidiary, are pushing the construction of the high-pressure system through the township of Holland to the city of Zealand—an enterprising community on the Grand Rapids, Holland, and Chicago Interurban line. It is expected that the line will soon be completed to the east of Zealand, which community will probably be having gas by the 1st of April. The main line from the plant of the Holland City Gas Company to the east end of Zealand is about five miles long, and by the time the pipes are laid, compressor and compression tanks will have been installed. An office is to be opened in Zealand, and it is anticipated that during the first year between 300 and 400 consumers in Zealand, and about 400 in the townships between that city and Holland, will be supplied, with the prospect of about 600 by the end of the second year.

Sulphur in Coke.

M. Skorédoff has found, in the course of desulphurizing experiments on coke, that, if it be broken small and heated in a porcelain tube in a current of steam, the sulphur that is in the form of ferrous sulphide (and probably also as calcium sulphide) passes off to the extent of about 44 per cent. when the temperature reaches 1500° Fahr. The process is most rapid during the first half hour, after which the hydrogen sulphide comes off more slowly. It is probable that the rest of the sulphur remains in the form of sulphates. A practical application is suggested for coke-oven works, by passing superheated steam over coke in air-tight receptacles, and recovering the sulphur evolved.

Road Surfacing Material.

A Belgian company for the manufacture of industrial fuels has taken out a patent for a process for the production of plastic masses capable of being used for surfacing roads. It consists in extracting from the tar the constituents which impart to it a crystalline structure and a caustic action, and adding to the product thus obtained, when heated, anthracenes and anthracenic oils; afterwards thickening the mass to the desired degree of viscosity by means of a current of air. It is claimed that the surfacing of roads by means of tars of this character, which are already oxidized, shows no tendency to crack, even when the roads on which they have been used have heavy traffic over them, and are subject to great variations of temperature.

Natural Gas in Hungary.

In the "JOURNAL" for Jan. 28 of last year appeared some details of the natural gas discovered in Transylvania, Hungary. It was suggested at one time that a supply of this gas should be sent to Budapest, which would entail the laying of a main some 250 miles long, at the same time supplying the various districts which would be situated on the route. There seems, however, at the present time no prospect of this scheme being put into effect. In the first place, interest and amortization on the first cost of the pipe line and distribution systems would be so heavy that the price of gas in Budapest would offer no advantages—at any rate for heating and power. Moreover, at present there are no means of knowing how large is the supply of natural gas; and it would be a great disaster if it suddenly ran short before a large portion of the capital outlay was paid-off. It seems probable, therefore, that, at any rate until some experience has been gained, the supply will be confined to the Transylvanian district. It would be courting disaster to rush into some gigantic scheme, and what should prove a valuable national asset might lead to serious financial losses.

Heating of Coke-Ovens.

Various systems of heating coke-ovens were compared last year by E. Lecocq in the "Revue de Métallurgie," with the object of determining whether it was profitable to heat the ovens with low-grade gas, using the coke-oven gas for other purposes. His tests were made on gas produced from coke, gas produced from coal, and blast-furnace gas, in each case mixed with 25 per cent. surplus of air. The gas and air were mixed at various temperatures; but the best results were obtained with both preheated to 600° C.—namely, 1940° C., 1908° C., and 1702° C. respectively with the three gases. The author formed the following conclusions: 1. If gas and air are introduced into the oven at 50° C., the necessary temperatures cannot be attained at all. 2. In the case of blast-furnace gas, the gas as well as the air must be preheated. 3. With the coal and coke produced gases, it is sufficient to heat only the air to 900° C. in order to attain the required temperature—this giving 1925° C. and 1880° C. respectively for coke and coal. The author considers that the weakness of the low-grade gas system is that so little of the heat of the waste gases can be utilized for heating the air.

Calorimetry and Comburimetry of Gas.

Is the calorific power sufficient of itself to define a gaseous combustible? This question was put to the Association of Engineers of the Polytechnic School in Brussels some months ago by M. Koopman, in a paper he submitted to them. M. Grebel is gratified to find the author, as well as several Belgian and Dutch engineers, in agreement with him on the question of the "comburimetry" of gas. M. Koopman came to the conclusion that the calorific power of gas alone is insufficient to determine its real utility. The consumers' interests in its three principal applications—heating, motive power, and incandescent lighting—are, in his opinion, guaranteed by the simultaneous testing of the illuminating power and the oxygen-carrying capacity, or "comburivorous power," as M. Grebel would call it, whence could be deduced the thermic power of the gas. In order to illustrate the difference existing in gases of similar calorific power but not of the same composition, M. Koopman reproduced, among other results, those obtained by Dr. W. B. Davidson in his experiments on the effect on the calorific and illuminating powers of gas of increasing by 1 per cent. each of the constituents of a gas of a determined composition—*i.e.*, about 530 B.Th.U. per cubic foot. M. Koopman's communication closes with a study of the Simmance-Abady calorimeters and of the Taplay gas analyzer.

Railway Carriage Lighting.

According to an article in "La Technique Moderne," it is estimated that at the present time there are about 200,000 railway carriages lighted by gas; 47,000 being in England, 16,000 in France, 60,000 in Germany, and 4000 in Holland. The substitution of gas for oil on the French lines entailed considerable expense, for the fitting-up of the carriages and the provision of underground plant for the charging of the reservoirs. The outlay for these purposes amounted to 3 million francs on the Northern line, 8 millions on the Eastern line, and 9 millions on the Paris-Lyons-Mediterranean line. With regard to accidents, the number of electric-lighted carriages being more than ten times less than that of those lighted by gas, it is not surprising that statistics appear to show more fires caused by the use of the latter than of the former illuminant. But the result of some investigations carried out in Germany in regard to train fires proved conclusively that these were neither caused nor aggravated by gas. After the Melun accident last year, M. Joseph Thierry informed the railway companies that the Administration would not in future authorize the construction of carriages in which gas would be used; and he invited them to turn their attention without delay to the means of abolishing this method of lighting express and fast trains. It was subsequently announced by the Minister of Public Works that, with the exception of the Eastern Company, all the companies had decided to adopt electricity on fast trains.

Air and Water Condenser.

Herr H. Hermanns describes a new condenser construction by the firm of Klönne, of Dortmund, in which both air and water are used. The hot gas is introduced at the top of the tower and distributed by a sieve over the whole section. The water-cooler is connected with this top section, and consists of a large number wrought-iron tubes, which are cooled by water. The water enters at the lower end of the bundle of tubes, and flows away at the top. The tar, which in consequence of its low temperature takes up the last traces of naphthalene, passes out by way of a visible overflow into the pipe leading to the tar-well.

COKE-OVEN GAS FOR TOWN PURPOSES.

A MEETING of the Birmingham and Midland Section of the Society of Chemical Industries was held last Thursday evening, in the University Buildings—Mr. Pinnock presiding. A short paper was given by Mr. E. W. Smith, M.Sc., Chief Chemist to the Birmingham Corporation Gas Department, on "Coke-Oven Gas for Town Purposes."

Mr. Smith prefaced his remarks by stating that what he proposed saying was in the nature of an informal talk to the members, preparatory to their visiting the installation of Koppers chamber ovens at the Saltley Gas-Works on Saturday [Feb. 7]. He remarked that some two years ago the Birmingham Gas Committee put in a trial installation of twelve Koppers ovens; and on account of the success which attended this installation, a further 54 ovens were decided upon. The advantages of this type of carbonizing plant were principally as follows: The production of a superior class of coke, which realized from 2s. 6d. to 4s. per ton more than retort coke; the reduction in labour costs; the possibility of recovering ammonia from the fuel, thereby reducing the carbonizing costs very considerably; and the low fuel consumption. At the same time, the results obtainable from the plant were quite equal to those of other systems. It was pointed out that the irksome illuminating power regulations still held good, but that 17-candle power gas by the No. 2 burner was constantly attained without difficulty; while the calorific value was never below 500 B.Th.U. It was interesting to note that the sulphur content of the gas from the chamber ovens, other than sulphuretted hydrogen, was lower by 20 per cent. than with retort gas; while the naphthalene content was about the same as that of vertical retort gas.

Mr. Smith described the Koppers oven in detail; explaining the method of heating, charging, and discharging, and the effect of stamped and unstamped charges on the coke. In addition to the oven coke being superior, a much greater yield of saleable coke was obtained than was the case with retort systems. Reference was also made to the Mond gas plants, and the apparatus to be employed for ammonia recovery from this gas. It was mentioned that the yield of sulphate expected was about 90 lbs. per ton of fuel gasified in the producers. The fuel consumption on the plant was expected to be about 14 per cent. of the weight of raw coal carbonized.

At the conclusion of the paper, a short discussion followed; and Mr. Smith, who replied to several questions, was accorded a vote of thanks.

WATER LEGISLATION FOR 1914.

IN preceding issues of the "JOURNAL" the principal features of the Gas Bills and Provisional Orders for the present session have been indicated. We now deal with the measures relating to water supply; taking first those promoted by companies.

The Bristol Water Company desire authority to raise additional capital to an amount not exceeding £100,000, inclusive of premiums; the dividend thereon to be at the rate of 7 per cent. per annum if issued as ordinary, and 5 per cent. per annum if as preference capital. The new shares or stock are to be sold by auction or tender. The Company ask power to borrow to the extent of one-fourth of the additional capital raised at the time of borrowing. [*Parliamentary Agent: Mr. J. Kennedy.*]

Authority is required by the Market Rasen Water Company to construct new works and raise more capital. The new works comprise three reservoirs in the parish of Tealby, in the rural district of Caistor, and a like number of aqueducts; and five years are required for their completion. The Company wish to be authorized to hold lands for protecting their works, to lay pipes in private streets, to make bye-laws for the prevention of waste, and to sell water by measure at a price not exceeding 2s. per 1000 gallons; also to sell meters and sell or supply fittings. The amount of additional capital specified is £7500, the dividend on which is to be 7 or 6 per cent. per annum, according as the money is raised as ordinary or as preference capital. Power is required to borrow to the extent of one-third of the original share capital authorized by the Company's Act of 1875 and of the amount of additional capital raised at the time of borrowing, including any premiums realized thereon; also to create debenture stock. The Directors desire to be authorized to appoint one or more of their body to be Managing Director or Directors, at a remuneration to be fixed by them; to fix the remuneration of the Secretary, and to acquire and let houses and other buildings for persons in their employ. [*Parliamentary Agents: Messrs. Lewin, Gregory, and Anderson.*]

The Mexborough Water Company are applying to be incorporated with further powers. Their limits are defined as the parish and urban district of Mexborough; and the capital is to be £22,000, whereof £12,000 is the original and £10,000 the additional capital. Borrowing powers are required to the extent of one-third of the amount called up at the time of borrowing, and it is to include the sum of £2500 raised on loan by the limited Company. Authority to create debenture stock is applied for. The dividends are to be 10 per cent. per annum on the original capital, 7 per cent. on the additional capital, and 5 per cent. on the preference capital. The existing works consist of a well and pumping-station, a service reservoir, a water tower and tank, and two aqueducts or pipe-lines; and the new works for the construction of which authority is sought are a receiving-tank and a line or lines of pipe. For the completion of these works five years are specified. The prices proposed to be charged for water are 8s. 8d. per annum where the gross estimated rental of the premises does not exceed £5; above this and up to £20, it is to be 7½ per cent.; above £20 and up to £40, 7 per cent.; above £40 and up to £60, 6½ per cent.; and above £60, 6 per cent. In addition, the Company wish to be empowered to charge not exceeding 10s. per annum for an extra closet, a like amount for a fixed bath containing not more than 70 gallons, and such sum as they may think fit for one holding more than this quantity. For water supplied by measure, the price is not to exceed 1s. 6d. per 1000 gallons. Other clauses in the Bill would give the Company power to supply fittings, to lay pipes in streets not dedicated to public use, and to enter into contracts for the supply of water in bulk. [*Parliamentary Agents: Messrs. Sherwood and Co.*]

The Bill of the West Gloucestershire Water Company is to authorize the construction of new works, the extension of the limits of supply, and for other purposes. The new works comprise a pumping-station in the parish of Shipton Moyne, in the county of Gloucester, a service reservoir in the parish of Dyrham and Hinton, three pipe-lines, and an access road. Seven years are required for their completion. The extended limits will include several parishes in the rural districts of Chippenham, Malmesbury, and Thornbury, and in the rural and urban districts of Tetbury. The water-rates in the new limits are not to exceed those charged in the old ones. The Company ask for authority to raise additional capital to the amount of £170,000, including premiums. The portion issued as ordinary capital will bear 7 per cent. dividend, and that issued as preference capital, which is not to exceed one-half, 5 per cent. Borrowing powers to the extent of one-third are required, as well as authority to create debenture stock. The Bill contains a clause enabling the Company to purchase by agreement the water undertaking of any local authority within the extended limits of supply. Provision is made for the appointment of a Managing-Director, and for the determination of the Secretary's remuneration by the Board. [*Parliamentary Agents: Messrs. Sherwood and Co.*]

Powers in regard to the supply of water are required by the following local authorities.

The Abertillery and District Water Board are applying for authority to build an additional reservoir, for compensation purposes, in the parish of Llanelieu, in the rural district of Hay, in the county of Brecknock. It will be formed by means of a dam or embankment across the valley through which runs the stream known as the Grwyne Fawr; and ten years are required for its construction. After the completion of the Helyg reservoir, certain specified provisions in regard to compensation water are to apply. The Board require power to borrow for the purchase of lands and easements and the construction of works the sum of £250,000, to be repaid within sixty years. [*Parliamentary Agents: Messrs. Lees and Co.*]

In a General Purposes Bill, the Corporation of Barnsley apply for an extension of time for constructing the Knoll Brook Water-Works and for an enlargement of their powers with respect to the water undertaking. The time limited by the Corporation Water Act of 1900 for carrying out the works named is to be extended for seven years from the passing of the Bill, when it is to cease so far as the uncompleted works are concerned. It is proposed that the words "annual value," in section 28 of the Barnsley Local Board Act, 1862, shall mean the "gross estimated rental" of the premises as ascertained by the valuation list in force at the commencement of the quarter in which the water-rent accrues. Authority is required to borrow £12,000 for the construction of the Knoll Brook works, a like sum for making additional filter-beds, and £6000 for new mains and other purposes—the first two amounts to be repaid within sixty years, the last within thirty-five years, from the date of borrowing. The Bill contains a proposal for the consolidation of the water-works loans already authorized; and so much of them as remains outstanding on March 31, 1914, is to be repaid within thirty-five years from that date. [*Parliamentary Agents: Messrs. Torr, Durnford, and Co.*]

In a General Powers Bill promoted by the Leeds Corporation they seek parliamentary confirmation of an agreement entered into by them with the Doncaster Corporation for affording the latter a supply of water. The proposal has, however, been rejected by the ratepayers, as recorded in another part of the "JOURNAL" to-day. The Rural District Council of Valley, in the county of Anglesey, are applying for authority to construct water-works for supplying the parish of Llanfaelog. It is proposed to take water from the Bodsuran stream and other streams and springs in its neighbourhood; and the works will comprise an impounding reservoir on the stream named, a service reservoir in the parish of Llanfaelog, one or more filter-beds, six aqueducts or pipe-lines, a road improvement, and a footpath diversion. The price to be charged for water is 8s. 8d. where the annual rack-rent of the premises does not exceed £5; where it is above this, 15 per cent. upon the rent. For every additional closet beyond the first, the Council ask to be allowed to charge up to 5s. per annum; for every fixed 50-gallon bath, up to 7s. 6d.; and for one of greater

capacity, such sum as they may think fit. Authority is required to increase the water-rates, with the sanction of the Local Government Board, should this be necessary for meeting the estimated expenditure of the undertaking. The charge for a measured supply is not to exceed 2s. per 1000 gallons. Should the quantity of water obtainable from the works authorized exceed that needed for the area specified, the Council wish to be permitted to use it for any contributory place within their district, subject to such terms and conditions as may be approved by the Local Government Board. The Council require power to borrow £20,000 for the purchase of land and the construction of works, and £2500 for mains and service-pipes; the former to be repaid within sixty, the latter within thirty, years from the date of borrowing. For raising any further money, the consent of the Local Government Board will be necessary. The Council wish to be empowered to sell meters and to supply fittings. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, and Co.*]

The Bill of the Mexborough Urban District Council is to authorize them to acquire the undertaking of the Mexborough and District Water Company, Limited, and make further provision in regard to the supply of water. The purchase is to be by agreement, or failing this by arbitration; a single arbitrator to determine the price in accordance with the provisions of the Lands Clauses Acts. The Company are to pay outgoings and be entitled to all receipts up to the transfer, and are to maintain the undertaking till this takes place. The water limits are to be the district of the Council. The rates for the supply of water for domestic purposes range from 7½ down to 6 per cent. per annum on the rack-rent or annual value, as the case may be, with the usual extras for an additional water-closet beyond the first and for fixed baths. The charge for water sold by measure is not to exceed 1s. per 1000 gallons; but the Council wish to be authorized to charge such minimum sum, not exceeding 10s., as they may prescribe in respect of the water supplied in any quarter of a year. Powers are required to sell meters and supply materials; also to sell water in bulk. Authority is sought to borrow the amount required to pay the purchase-money and the Council's incidental expenses; and they ask for fifty years within which to repay it. For raising any further moneys necessary for the purposes of the Act, the consent of the Local Government Board will have to be obtained. [*Parliamentary Agents: Messrs. Baker and Sons.*]

In a General Powers Bill promoted by the Newport (Mon.) Corporation authority is sought to purchase and hold lands and exercise powers for the protection of waters. The Corporation desire to be relieved of the obligation to supply with water otherwise than by measure any dwelling-house of which a part is used by the same occupier for any trade, business, or manufacturing purpose for which water is needed. The Corporation require power, notwithstanding anything contained in section 70 of the Water-Works Clauses Act, 1847, to declare by resolution that their water rents, rates, and charges shall be payable at such half-yearly or other date or dates as they appoint; but no one is to be compelled to pay water-rents for any longer period in advance than three calendar months. Other provisions relate to the rates payable by owners of small houses and of buildings let in separate tenements. A sum of £5000 is required for the purchase of lands and for the construction of works for preserving the sources of water supply, to be repayable within sixty years. [*Parliamentary Agents: Messrs. Rees and Freres.*]

The Northwich Urban District Council are applying for authority to construct water-works and acquire additional lands. Confirmation is sought for the existing works, which consist of wells and boreholes near Cote Brook, in the parish of Utkington, in the urban district of Tarporley. The new works comprise a pumping-station in the parish of Delamere, in the rural district of Northwich, a covered reservoir in the parish of Utkington, and two aqueducts or pipe-lines. Five years are required for their completion. It is proposed to ask for an extension of the limits of supply so as to include the parishes of Rudheath and Winnington, in the rural district of Northwich. The Council require power to sell or let meters, supply fittings, &c. A sum of £20,000 is wanted for the purchase of lands and the construction of works; and fifty years are asked for its repayment. [*Parliamentary Agents: Messrs. Lees and Co.*]

A General Powers Bill promoted by the Ossett Corporation contains some provisions in regard to their water undertaking. They may be summarized as follows: They wish to have and to exercise the powers which a local authority would have under section 54 of the Public Health Act, 1875, with respect to the carrying of water-mains within and beyond their district; and for the purposes of this section the water limits of the Corporation are to be deemed to be their district. They apply for power to lay pipes in private streets, repair communication-pipes, and fix meters and other apparatus for detecting and preventing waste; also to sell meters, and sell and supply fittings. They propose to purchase or take on lease dwelling-houses for persons employed by them for the purposes of their water undertaking; and they require authority to erect and maintain such buildings on lands belonging to or held on lease by them. Power is sought to sell water in bulk outside the limits. Any additional money needed for the purposes of the Act is to be obtained with the consent of the Local Government Board, and to be repaid within a period to be prescribed by them. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, and Co.*]

The Bill of the Preston Corporation contains a number of provisions in regard to the supply of water. The Corporation require power to lay pipes in streets not dedicated to the public use, and both within and beyond their district, repair communication-pipes, fix meters, and other appliances for the detection and prevention of waste, supply fittings, and enter into contracts for the sale of water in bulk. It is proposed that the water-rate in respect of small houses shall be paid by the owner. [*Parliamentary Agents: Messrs. Sherwood and Co.*]

The only portion of the Sheffield Corporation Bill which relates to water supply is clause 6, by which the Corporation seek to substitute for section 85 of the Derwent Valley Water Acts, 1899 to 1909, dealing with the apportionment of the expenditure of the Derwent Valley Water Board between the constituent Corporations, a new section under which all expenditure incurred for their combined use or benefit is to be borne by them in the ratio of their statutory proportions. Other expenditure specified is to be borne by the Corporation or Corporations for whom it has been incurred; and if for more than one, it is to be apportioned. All revenue accruing to the Board is to belong to the four Corporations in their statutory proportions. It is proposed to ask Parliament to set aside the award of the Standing Arbitrator to the Board, dated Nov. 2, 1912, and the order of the High Court of Justice confirming it, placing on the Corporation the expenditure on certain works, and make them responsible for their proportion only. Any money the Corporation have paid to the Board in this connection is to be refunded. [*Parliamentary Agents: Messrs. Sherwood and Co.*]

The Bill of the Corporation of Swindon is to sanction the acquisition of the site of a portion of the works and property of the Wilts and Berks Canal Company, including the Coate reservoir, which will form part of their water undertaking. Permission is asked to use the reservoir as a public park or pleasure-ground. [*Parliamentary Agents: Messrs. Martin and Co.*]

Authority is being sought by the Tees Valley Water Board to construct additional works, consisting of a service reservoir in the parish of Ormesby, in the rural district of Middlesbrough, three conduits or pipe-lines, and a deviation conduit; and they are to be completed by Dec. 31, 1916. It is proposed to extend the limits of supply so as to include several parishes or townships specified, and to increase from 2 million to 5 million gallons the quantity of surplus water they may supply to Messrs. Walker, Maynard, and Co. Section 61 of the Act of 1907, so far as it relates to the supply of water for trade, manufacturing, or railway purposes to consumers of not less than 5 million gallons per quarter, is to be repealed, and for six years from Dec. 31, 1913, the Board ask to be authorized to charge other rates specified. The three Corporations constituting the Board require power to borrow—Stockton to an amount not exceeding £36,103; Middlesbrough, £43,324; and Thornaby-on-Tees, £7220. [*Parliamentary Agents: Messrs. Wyatt and Co.*]

The Bill promoted by the Weston-super-Mare Urban District Council is to obtain authority to construct water-works, consisting of a pumping-station and auxiliary works at Banwell, in the rural district of Axbridge, a covered intake tank there, two service tanks at Weston, and several pipe-lines. Parliament is asked to empower the Council and the Bristol Water Company to carry into effect an agreement for the sale and purchase respectively of the Banwell Brewery and water rights and other property of the Company at Banwell, for the sum of £4000. The Bill contains general provisions relating to the supply of water, including its sale in bulk. [*Parliamentary Agents: Messrs Dyson and Co.*]

The Corporation of Worthing are applying for an extension of their water limits so as to include the parishes of Durrington and Goring, in the rural district of East Preston, in the county of West Sussex; and the necessary authority is sought in a General Powers Bill which they have promoted. They also require power to maintain, alter, and enlarge their existing water-works, and make subsidiary works. The rate to be charged within the borough for a supply of water for domestic purposes is not to exceed 7 per cent. per annum on the rateable value of premises, with the usual extras for an additional closet and a bath. In the two parishes proposed to be included within the limits, however, the rates are not to exceed twice the amount of those which may be made in respect of premises of the same rateable value in the borough. For supplies by meter the price per 1000 gallons is not to be more than 1s. in the borough and 2s. in Durrington and Goring. The Corporation require power to supply, repair, and alter fittings, and to supply water in bulk by agreement outside their statutory water limits. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, and Co.*]

Tars and Heavy Oils as Fuels.—There was an article in the Engineering Supplement of "The Times" last Wednesday, dealing with the use of tars and heavy oils as fuel for steam raising and other industrial purposes, in which it was pointed out that the possibilities of coal tar as a cheap fuel for boiler firing were recognized some years ago, at a time when the price was in the neighbourhood of 1d. per gallon. Now, however, chiefly owing to the heavy demand for road purposes, the value has risen to more than three times this figure. The writer went on to say that the coal-gas residual is by no means the only tar which lends itself to such applications; and apparatus can now be obtained which is capable of dealing with the less refined residues—such as those resulting from the production of Mond gas and carburetted water gas. With the latter tars, there is the difficulty of water to contend against.

LARGE-CAPACITY GAS-EXHAUSTERS.

By JOHN FOSTER, Engineer of the Windsor Street Gas-Works, Birmingham.

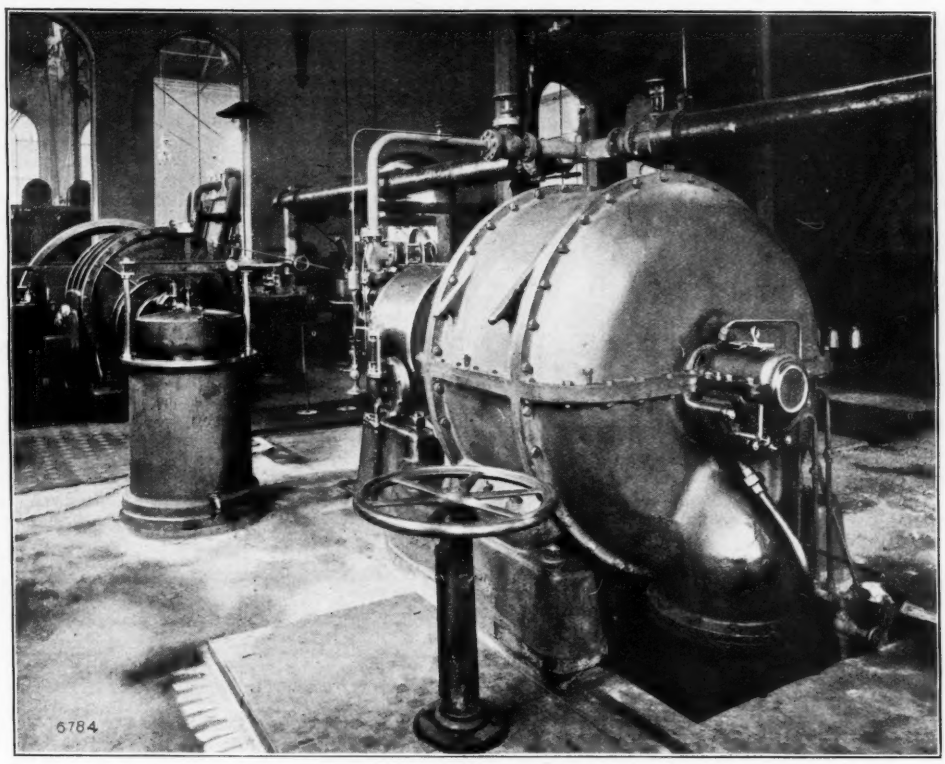

Fig. 1.

EXPERIENCES gained in the running of large coal-gas exhausters must vary considerably with the design and the varying conditions under which they have to work. My own experiences have at times been very unpleasant, and led me to think that the mechanical design—especially of large exhausters—is anything but perfect. Their efficiency, too, is low—a fact more especially brought before my notice since the introduction of the large gas compressors at these works.

SALT DEPOSITS.

When one carefully considers the large frictional area brought into play by the roll and its blade or blades, together with the guiding segments running in the grooves at each end of the exhauster working in foul gas impregnated with sticky tar and ammonium salts, it is not surprising that the difference between the mechanical efficiency and the working efficiency is not greater than it is. The ordinary exhausters at these gas-works vary in capacity from 150,000 cubic feet to 300,000 cubic feet per hour. They take hold of the gas after it has passed through the Livesey washers, and consequently it is practically depleted of all tarry oils, but strongly charged with ammonium salts, including the chlorides. Notwithstanding a plenteous supply of good lubricating oil, these salts separate and collect in the various crevices of the exhausters, and, even on the short Sunday stoppages, they set like cement, making it practically impossible to restart without severely straining the working parts. In fact, on several occasions it has been necessary to take the exhauster to pieces and thoroughly clean it; and once or twice when this had been done we have found the small lugs on the blades which drive the guiding segments have been broken off, and at other times the blades themselves have been broken. Several classes of cleansing oils have been tried, of which our own water-gas tar oil proves to be the most efficacious in keeping the blades and segments free and clear of all deposits.

We were, however, no sooner out of one difficulty than into another, as we found after using this tar oil for a year or two that some kind of softening action was taking place on the metal, causing the blades to break readily. The contractor to whom these repairs were given informed me that something was wrong with our method of lubrication, as quite a different action was taking place to that of any that had been previously experienced. I could only conclude that it was due to the combined action of the ammonium salts and the water-gas tar oil, as we had never had this trouble previous to using this material in the coal-gas exhausters, nor have we ever experienced the slightest difficulty with our water-gas exhausters. On discovering this, we immediately reverted to the use of a light cylinder oil, in the hope that, being of good lubricating properties and of a higher viscosity than ordinary engine oil, it would remain on the wearing surfaces much longer than the lighter oils, and so keep the ammonium salts in suspension. The oil is pumped at strong pressure, and is well distributed throughout the working parts; but notwithstanding the greatest care, and the turning round once every shift of standing exhausters we still find there is occasional difficulty in re-starting them.

TURBO-DRIVEN EXHAUSTERS.

The increase in output from these works necessitated an extension to the existing exhausting plant; and being confronted with the aforementioned difficulties, together with the fact that very little room was left in the existing exhauster-house to instal a plant of sufficient capacity to place us in a safe position in case of a breakdown, I was naturally driven to look into the merits of the turbo-driven fan type of exhauster. On making inquiries as to the experience gained with this class of plant, I found that in only one gas-works—viz., Mariendorf, Berlin—had this type of plant been employed for foul gas; and this I understand had been running very satisfactorily during the short time it had been in use. I gathered, however, that it was being extensively used in coke-oven plants, but with rather mixed results. In some cases they had had trouble with leakages of gas from the glands, and in others the impeller wheels, which were built-up of wrought steel and rivetted, had very soon given way from corrosion of the rivets, and subsequently the wheels had become unbalanced, resulting in uneven pulling.

The turbo exhauster made by the British Thomson-Houston Company, Limited, of Rugby, presented such favourable features for continuous running that a contract was entered into with them for the supply of a steam turbine driven exhauster, capable of withdrawing 500,000 cubic feet of coal gas per hour, and exerting a suction of 18 inches water gauge at the inlet, and a pressure on the delivery of 40 inches water gauge. As will be seen from the reproduced photograph [fig. 1.] taken on the site, the set consists of a "B.T.H." Curtis Impulse type steam turbine, direct-coupled through a flexible coupling to a two-stage rotary exhauster; the complete unit being mounted on a rigid combined base-plate. The normal speed is 3600 revolutions per minute, and in spite of this high speed the machine is remarkable for its freedom from vibration and the entire absence of appreciable noise. The steam turbine is fed with dry saturated steam at a gauge pressure of 120 lbs. per square inch, and exhausts into a barometric condensing plant which maintains a vacuum of 26 inches. It is constructed on the well-known Curtis principle, as standardized by the "B.T.H.;" and, possessing as it does large blade clearances, it is eminently a machine of extremely robust character. One of my specified conditions was that the exhauster should maintain a constant vacuum within one-twentieth of an inch water gauge, irrespective of any variations in the quantity of gas

delivered. This is obtained by operating the turbine throttle valve by a "Waller" float governor connected to the suction branch of the exhauster. Any variation of pressure at this point is thus communicated to the inside of a bell-float which, rising and falling in a water-bath, opens or closes the turbine governor valve, and thus readjusts the speed of the set to give the required suction. This governor is shown in fig. 2. That this condition has been amply fulfilled is shown by the chart [fig. 3] taken on a recording pressure-gauge having a very wide scale.

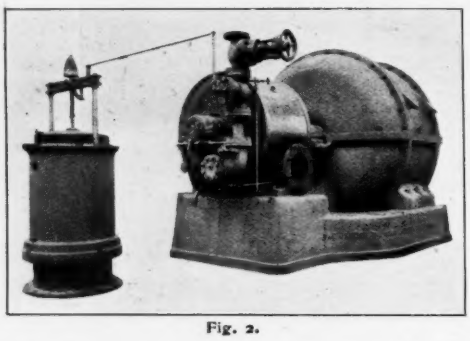

Fig. 2.

The exhauster possesses two impellers connected in series and arranged back to back, in order to obviate end-thrust. Suction and delivery branches are arranged on the under side of the casing, which is divided on a horizontal plane. The machine

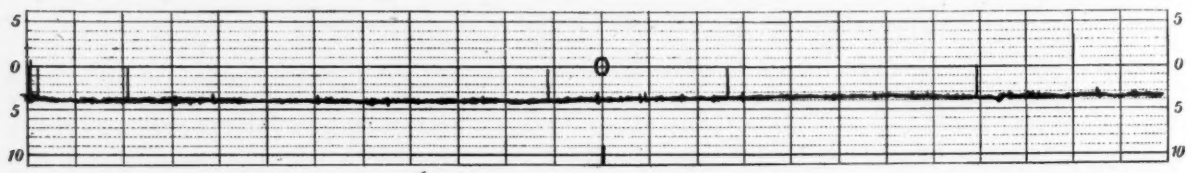

Fig. 3.

can thus be opened-out for examination without breaking any pipe joints. Fig. 4 shows the exhauster with the top half of the casing removed and the rotating portion in position. Fig. 5 shows the impellers, which are of unique design, being solid castings of special steel, with blades and hub in one piece except for the inlet ends of the blades, which, being twisted in order to give free entry of the gas, are mounted on a small extension hub. These latter blades, being short, are not unduly stressed by centrifugal force. This solid impeller construction obviates the use of the rivets which are employed in the usual built-up design to hold the

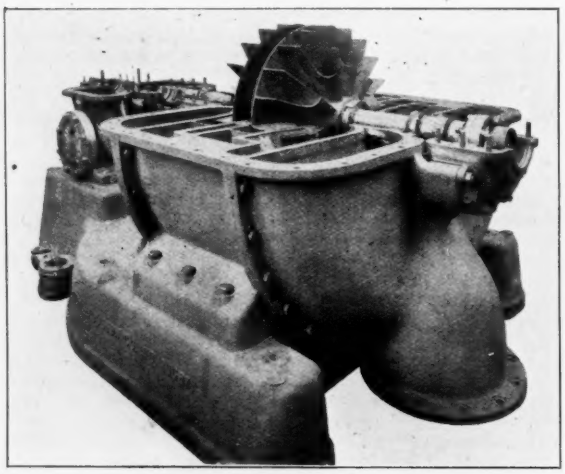

Fig. 4.

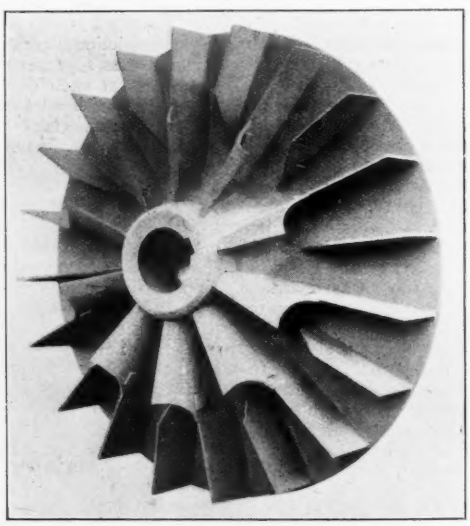

Fig. 5.

hub and blades together, and which are subjected to a shearing stress and corrosion, as I have previously mentioned.

I understand the B.T.H. Company have built a number of machines with similar solid impellers, and have found that, if carefully cast, the resulting finished product is entirely satisfactory, and the finished wheels require little or no balancing. The hubs of the impellers are wide, in order to reduce the circumferential stresses which tend to make the bore open-out when running at a high speed, and thus cause a looseness on the shaft. A further point to be noted is the use of narrow bronze bushings in the bore of the impeller. This design, I believe, has been in use for some time for turbine disc wheels, and has been found entirely satisfactory, as, in spite of the fact that a force fit is employed, the bronzed bushes enable the wheel to be removed and replaced many times without injury. On leaving the impellers the gas passes through a series of exit guide blades, the function of which is to convert the velocity energy into pressure energy. A diaphragm is fitted between the two impellers; and this carries a "B.T.H." patent yielding packing-ring which embraces the shaft and prevents leakage from stage to stage. The shaft of the exhauster runs in its own bearings, one of which possesses thrust collars to maintain the correct relative position of the rotating and stationary parts, although, as mentioned above, the end thrust is balanced. On account of the large quantity of gas and the consequent axial width of the impellers, the distance between the centres of the bearings is comparatively large, and the high speed adopted renders it necessary to keep the critical speed of the exhauster below the running speed.

In order to damp-out any vibrations which may occur when passing through the critical speed when running up to speed, a special form of slip bearing has been adopted at the outboard end. This bearing has also been adopted from the "B.T.H." turbo-alternator design, its use having been proved beneficial in similar cases. It consists of an ordinary spherical bearing bush held in the pedestal by side cheeks, to which the flange on the bearing is held by means of bolts with spring washers. Any lateral vibration is thus damped-out by the friction of the bearing flange on the supporting cheeks. Water-sealed glands are provided, the paddles of which work against a head of some 10 feet caused by fixing the sealing tank at this height above the exhauster centre-line. These glands are very efficacious in preventing the escape of gas, and use quite a small quantity of sealing water. In fact, the quantity is so small that we have found it advisable to replace the iron supply pipes with tinned lead pipes, as corrosion set up and stopped the supply altogether. There is no rubbing contact employed, and therefore sparks cannot be generated and cause a possible explosion by the ignition of any escaped gas.

With regard to the comparative cost of the ordinary and turbo-exhausters, in our case the latter cost less than one-half that of the former. The relative space occupied by the two machines is shown in fig. 6, p. 351. The turbo-exhauster has now been running very satisfactorily for a period of five months. It adapts itself to any load, and there is not the slightest difficulty in maintaining a steady vacuum even when the output drops to 20,000 cubic feet per hour. The guaranteed steam consumption was from 3 to 5 per cent. less than the ordinary exhauster on the average of the full, half, and quarter loads, and our short experience fully bears this out. I estimate too that we shall save upwards of £160 per annum in the consumption of lubricating oil. The only factor now to be proved is the wear and tear on the impeller wheels and shaft. But, as the cost of these is very small, and they are readily replaced, the upkeep will not, I am sure, reach a figure that will make it prohibitive.

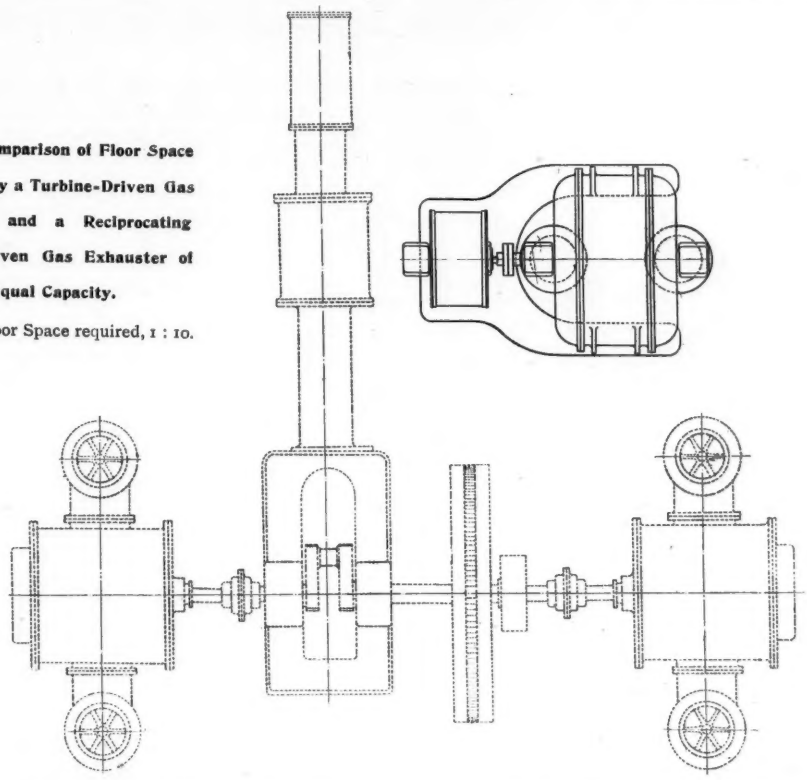

Fig. 6.—Comparison of Floor Space Occupied by a Turbine-Driven Gas Exhauster and a Reciprocating Engine-Driven Gas Exhauster of Equal Capacity.

Ratio of Floor Space required, 1 : 10.

CHEMISTRY OF COAL CARBONIZATION.

THIS was the subject of a lecture recently delivered by Dr. JOHN HARGER before the Liverpool Section of the Society of Chemical Industry.

Dealing first with the difficulties of coal research from the chemical point of view, the lecturer stated that, in spite of the labours of many able workers for nearly a century, practically nothing was known of the chemical composition of the coal substances. Coming to the coking property of coals, the lecturer referred to the controversy between Dr. Wheeler and Professor Lewes in regard to the *modus operandi* of the decomposition of the coal substances on heating; and it was clearly shown that the view of Professor Lewes, that the later decomposition in carbonization at the higher temperatures was a splitting-up of pitchy products formed at an earlier stage, was quite correct. It was also shown that a very subtle change in ordinary bituminous coal takes place on heating to about 270° C. (probably below this) which has been hitherto overlooked, and that it was necessary to "scrap" the views hitherto held about hydrocarbon constituents in coal, and give a totally new explanation of the property of coking in some coals and the absence of it in others.

In the concluding portion of his lecture Dr. Harger expressed the opinion that modern gas-works practices need revision, in view of the changed state of affairs in traction and with petrol in demand and jumping-up in price. A gallon of petrol was worth to the gas manager 2000 cubic feet of gas before it was made; and the aim of managers should be to get the most valuable total products. It appeared to him that present-day gas-works practice was more suitable for old-time requirements, and the old-time practice of low-temperature distillation more suited to our present needs of a supply of petrol and a smokeless fuel which would burn readily in an ordinary fire-grate. The gas manager and the coke-oven manager would, he said, obtain very valuable information if they studied the phenomena of large gob fires; for their nature showed how, under certain circumstances, it was difficult to prevent heating of coal, and also how to make a good coke from a coal which no existing coke-oven process could coke at all.

A JAPANESE VIEW OF SURFACE COMBUSTION.

THE January number of the "Journal of the Imperial Gas Association of Japan" contains the following article, by Mr. A. Naits, entitled "Reflections on a Revolution in the Process of Coal Gas Manufacture suggested by the Application of Surface Combustion as Introduced by Professor Bone."

The process of surface combustion introduced by Professor Bone was in the first instance applied to metal smelting and the generation of steam by means of a special type of gas-fired boiler; but it seems that this process might be equally applicable to the carbonization of coal, and that through its introduction a great many changes in the present methods would result. The difficulty, however, appears to be in discovering the right kind of materials to withstand the high temperatures.

Professor Bone suggested that this process of surface combustion could be adopted for the purpose of retort-heating, whereby the secondary air supply might be dispensed with. This would mean a great saving in ground space, and also lessen to a very large extent the heavy costs for fire-brick, &c., that are necessary in the present method of gas heating.

Looking at the matter from an economical point of view, it would appear to be far more profitable to apply this process to the direct carbonization of coal in the first instance, instead of utilizing the gas generated from the coal for metal melting. Owing to the many improvements that have been carried out in the method of coal carbonization during the last ten years, the retorts themselves have undergone various evolutions, resulting at the present stage in the vertical type; and great economy in the production of gas has been effected.

On looking back, however, we find that, in spite of the many changes that have taken place, the method of indirect heating through retort walls by producer gas, as was in vogue in the days of Murdoch, is still adhered to, and monstrous gasholders are at the present time unsightly indications of the slow progress made in the gas engineering world as compared with the enormous strides that have been made in the development of some of the other sciences. Is it that there is some hidden mystery baffling those striving to improve the methods of gas generation and its application?

If the fact, once ascertained, that oxy-hydrogen gas when brought into contact with a body in a granulated state will be completely combusted without explosion, it may be concluded that, when coming into contact with coal, the result will also be complete combustion, at the same time causing the carbonization of the coal. The gas resulting from this contact would consist of hydrocarbon and steam vapour. The latter could be separated from the gas without difficulty.

Assuming that the constituents of 100 kilos. of coal and the temperatures for its complete carbonization are as follows:

	Per Cent.		Spec. Heat.		Temperature. Deg. C.
Coke	35	..	0·4	..	1000
Ash	10	..	0·2	..	1000
Volatile matter . . .	33	..	0·33	..	200
Water	2	..	697 cal...		100

then the heat required for carbonization will be calculated at 27,422 calories. If water gas containing H_2 50 per cent., CO 40 per cent., CO_2 4 per cent., and N_2 6 per cent., and having a heating value of 2550 calories per cubic metre, is used together with a corresponding amount of air in place of the oxyhydrogen, and if we assume that 33 cubic metres of coal gas, the constituents of which are H_2 47 per cent., CH_4 34 per cent., CO 9 per cent., C_nH_m 5 per cent., CO_2 2 per cent., and N_2 3 per cent., and the heating value 5894 calories per cubic metre, will be produced from 100 kilos. of coal by the usual method of gas production, what will be the result and amount of mixture of coal gas and the products of combustion?

For developing 27,422 calories 12 cubic metres of water gas are necessary, and the volume of the products of combustion therefrom will be 26·4 cubic metres (N 80 per cent., CO 20 per cent.). Therefore, together with the 33 cubic metres of coal gas, we have a total of 59·4 cubic metres produced, the constituents of which are H_2 26 per cent., CH_4 19 per cent., CO 5 per cent., C_nH_m 3 per cent., CO_2 10 per cent., and N_2 37 per cent., and the calorific value 3300 calories per cubic metre. The preceding figures are based on assumption; and experiments will have to be carried out to ascertain their accuracy.

ATTACHMENT FOR INTERLOCKING GASHOLDER AND OTHER VALVES.

In response to inquiries from a number of readers, we publish the following illustrated description of the system of interlocking gasholder and other valves referred to in a letter appearing in our issue of Dec. 30 last, written by the designer of the attachment, Mr. James Hewett, the Distributing Engineer to the City of Birmingham Gas Department.

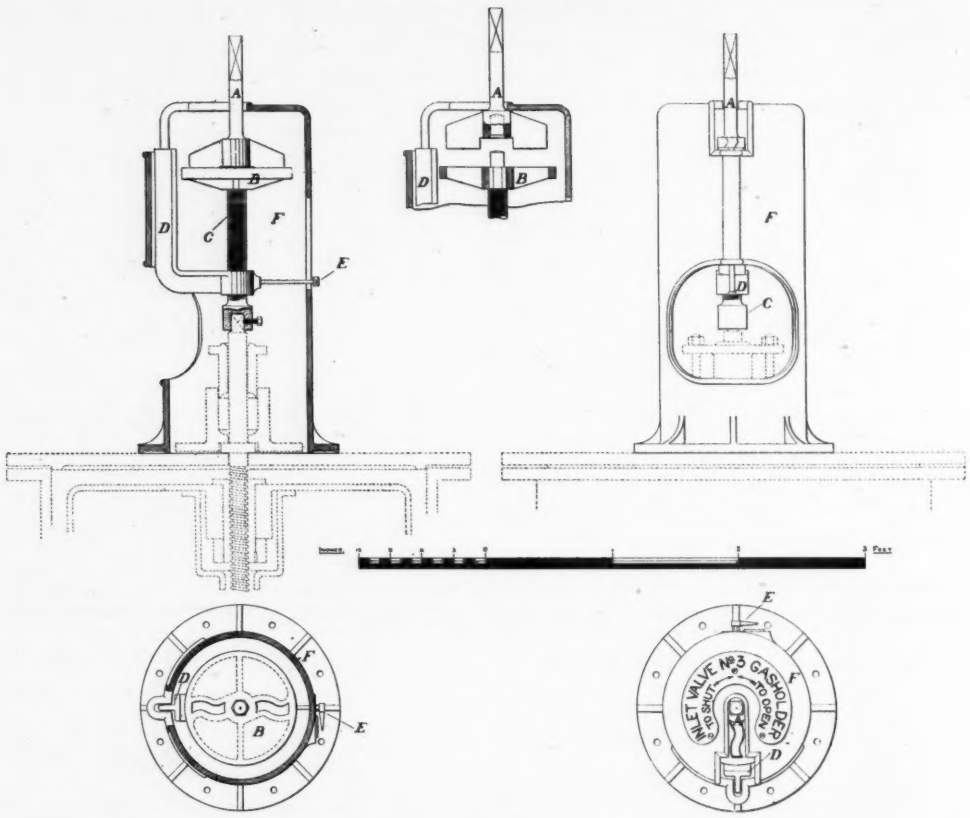

Fig. 1.

The attachment was devised for use in connection with valves working in series; the objective being to render impossible the occurrence of such mistakes as closing the only open inlet or outlet valve of gasholders, opening the outlet-valve of a producer-gas plant prior to closing the valve on the service off a town's gas distributory system, or *vice versâ*, &c.

Each valve of the series to be interlocked is provided with a key of special design, and an attachment so arranged that the withdrawal of the key is impossible unless the valve is in a certain condition—open or shut, according to the *desideratum* being to ensure that one or more of the valves shall be open or shut, respectively. The keys for any one series are interchangeable, and different from the keys for other series of valves upon the same works.

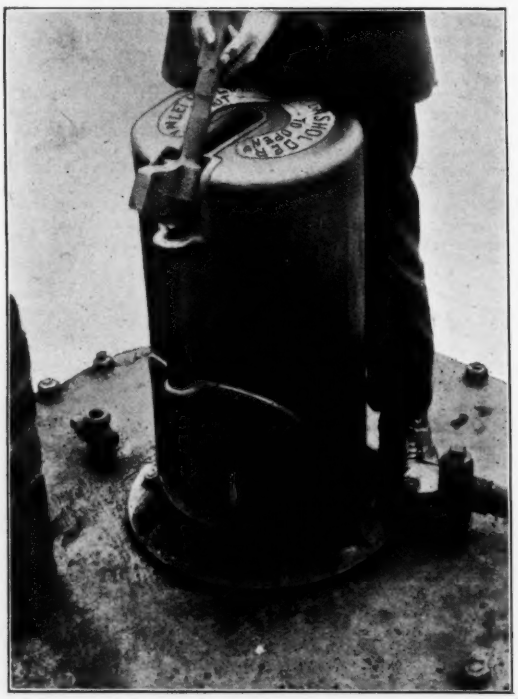

Fig. 2.

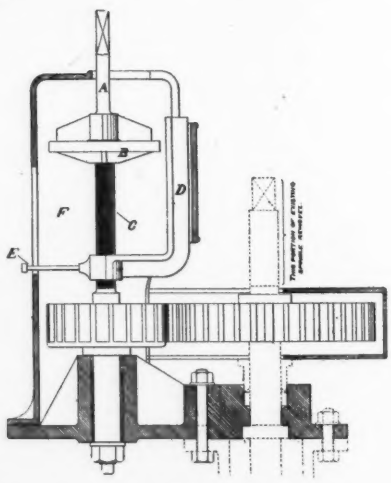

Fig. 3.

The interlocking is effected by the withdrawal, and placing in a position of security, of one or more of the keys, thus rendering them inaccessible to the men controlling the working of the valves. Take, for example, gasholder inlet-valves each provided with a special key and an attachment arranged so that the valve is open when the key is removable. One key is withdrawn from use. Necessarily the valve from which the key is extracted is open; and before it can be closed another valve must be open or opened, so that a key is available to effect the operation, and so on. While assuring that one valve is always open, the working of the valves is not otherwise in any way affected. Any or all of the valves may be open, or any or all with the exception of one (not

restricted to any particular valve of the series) may be shut. If it is essential that more than one valve shall be open at a time, keys corresponding in number to the minimum number of valves to be open are withdrawn from use.

On the other hand, it may be required that not more than one of a series of valves is open at a time, as in the case of a dual supply of town's and producer gas. To meet this requirement, the attachment is arranged so that the valve is shut when the key is removable. One key is withdrawn from use; and the valve from which it was taken is shut. The second valve may be open or shut, but has to be in the latter position before the key can be employed to manipulate the other valve. In conjunction with "hydraulic" valves under reasonable supervision, the attachment effectively provides against intermixing of the two gases.

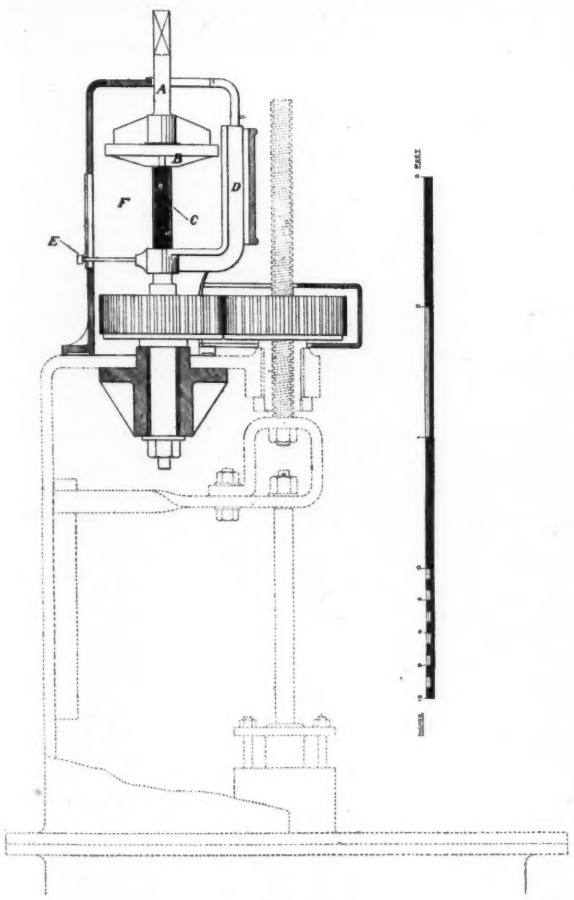

Fig. 4.

The attachment is made in a variety of forms; that illustrated being the pattern selected in 1904 for the inlet-valves of the holders at the Birmingham Gas-Works. Its application to valves with a rotating spindle devoid of longitudinal movement is shown in figs. 1, 2, and 3, and to valves with a spindle travelling in the direction of its axis in fig. 4. The gear-wheels in fig. 3 are not essential to the system, but are embodied to reverse the direction of rotation of the valve-spindle, so as to secure uniformity in working the valves. The gearing of valves which prior to the provision of the attachment required more than one man to actuate, is proportioned so that the operation is now performed single-handed. The case with glazed front, attached to an internal wall of the meter-house, and containing the key withdrawn from one of the valves to effect the interlocking of the series, and also the notice relating to the use of this key in cases of necessity, and the penalty attached to its wrongful removal, are illustrated in fig. 5.

The constitutive parts of the attachment are as follows: The key A consists of a bell-mouthed annular boss, with radiating arms of special design projecting below the underside of the boss, and a circular shank terminating in a square to take a standard double-handed turnkey. The key-carrier B is a circular casting flat on the top, with a polyhedral hole at the centre, and radial slots corresponding in shape, number, and position with the projecting portions of the arms of the key. The locking-bar D comprises an internally screwed boss and a rectangular arm of T-section, with the table of the same width as the diameter of the boss of the key. The spindle C is threaded to accord with the screwing of the locking-bar, shaped at one end for a sliding and driving fit in the holes of the key and the key-carrier, respectively, and arranged at the other extremity to suit the top of the valve-spindle or gear-wheel and bearing. In the case of new valves or existing valves when, owing to wear and tear, the renewal of the valve-spindle is inevitable, provided the attachment is applicable without the interposition of gearing, the spindle C and the valve-spindle are embodied in one piece. The casing F is a hollow cylindrical casting, with a flat top enclosing the key-carrier B, the spindle C, and the locking-bar D. An aperture capable of passing the lower portion of the key is arranged in the cylinder immediately below the top of the casing; and a slot in the latter, of a width slightly in excess of the diameter of the shank of the key, leads from the aperture to the centre of the casing. Below the aperture, a groove is formed along the cylinder, in the direction of its axis, to partly surround the stem of the locking-bar D; and an opening provides means of access to the stuffing-box of the valve-spindle, &c.

In the illustrations, the valve is shown in the open position. To close a valve, the key is inserted through the aperture in the casing F (as shown in fig. 2), placed upon the protruding portion of the spindle C, and rotated. When the projections of the radiating arms of the key coincide with the slots in the key-carrier B, the key falls into position. A turnkey is then applied to the top of the key, and the valve closed. Coincidently with this operation, the locking-bar D rises; and this reducing the size of the aperture in the casing F, the key A cannot be removed from the casing F until the valve is re-opened and the locking-bar D resumes its original position.

The system, though simple, is effective, and may be relied upon to satisfactorily fulfil the purposes for which it is intended. The attachments have been in daily use for upwards of nine years, and close observation has failed to reveal any shortcomings.

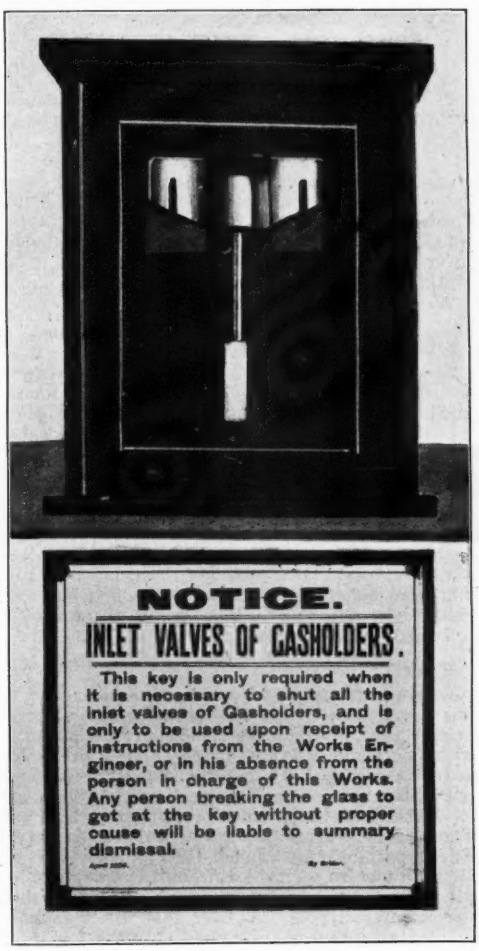
NOTICE.
INLET VALVES OF GASHOLDERS.
This key is only required when it is necessary to shut all the inlet valves of Gasholders, and is only to be used upon receipt of instructions from the Works Engineer, or in his absence from the person in charge of this Works. Any person breaking the glass to get at the key without proper cause will be liable to summary dismissal.

Fig. 5.

The manufacture of the attachment is not subject to royalty or payment of any kind, and has been taken up by a number of firms, including the Bryan Donkin Company, of Chesterfield, Messrs. Westwood and Wright, of Brierley Hill, Messrs. W. C. Holmes and Co., of Huddersfield, Messrs. Blakeborough and Sons, of Brighouse, and Messrs. W. J. Jenkins and Co., of Retford. A model of the attachment was exhibited by the last-named firm at the National Gas Exhibition last October, at Shepherd's Bush.

Southern District Association of Gas Engineers and Managers.—We learn from the Hon. Secretary (Mr. H. C. Head, of Winchester) that the annual meeting of the Association will be held at the Hotel Cecil on Thursday, March 12, when the President, Mr. Thomas Glover, of Norwich, will deliver his Inaugural Address. After the meeting the members will, as usual, dine together.

WORKS TOPICS—XIX.

By "Modus Operandi."

Some of the lessons to be learnt from a close consideration of the methods employed by companies supplying very cheap gas were discussed last week; the presidential remarks of Mr. Morland (Gloucester) being the theme on that occasion. Mr. H. O. Carr's address to the Southern Association was of particular interest to works' managers, especially on the question of coal handling—a subject of considerable importance in gas-works.

Coal Handling.

Economy in coal handling has careful consideration at Wandsworth. Not only is the coal very cheaply transported from the pit's mouth to the works by the Company's own steamers, but it is also handled with equal economy to and from the coal stores on the works. This is clear from Mr. Carr's address. To elucidate my remarks, it should be mentioned that the coal is first discharged into barges in mid-stream by cranes mounted on a pontoon. The barges, each of which holds several hundred tons, are then unloaded alongside the wharf by cranes with 30 cwt. grabs discharging the coal into breakers, from which it drops into the retort-house conveyors. This is obviously a very cheap method of getting the coal into the retort-houses at a small cost. We are told, in fact, that the "cost of all labour from barge into store is, as near as possible, $\frac{3}{4}$d. per ton."

At some works of good size one sees clumsy and very extravagant methods of handling coal. For such methods there is no excuse, for coal lends itself admirably to mechanical transport. It is, unlike hot coke, very light on wear and tear expenditure. Besides, there is always twice as much coal as coke to be handled, and in this matter quantity is a great consideration. It is not sufficient to provide cheap means of conveying coal into stores; provision must also be made for transporting it from stores into machine hoppers, and from outside stores into retort-houses.

At Wandsworth elevators fixed on the charging machines lift the coal from side stores into the machine hoppers; and undoubtedly this is a system which in certain cases is economical in first cost and in working.

The "Tunnel" System.

For filling and emptying large coal stores, the "tunnel" system, as used at Wandsworth, is well worth consideration. It is rarely seen in gas-works, though it has many obvious advantages where the stores are constantly used, and where sufficient tonnage will be handled to pay for the standing and other charges on the plant. As Mr. Carr pointed out, this method is an ideal one for dealing with "hot" coals. An important point in the design of handling plant of this description is the possibility of combining in one plant the ability to handle the material both on its entrance and exit from the stores. The "tunnel" system, which, of course, consists merely of an endless conveyor passing under and over the stores, is admirably adapted for both purposes. The same system, although in a modified form, is very extensively adopted in large boiler installations for handling both coal and ashes; and it may also be seen in a number of purifying houses for working the top and bottom floors.

Combined Coal and Coke Handling Plants.

This question of combining in one plant means to carry out two operations is well illustrated in the recent designs of continuous vertical retort plant, in which the same conveyor carries coal to overhead hoppers and coke to storage hoppers or screens. In some cases, the conveyor is extended sufficiently to handle coal in and out of stores, as well as for transference from stores into hoppers. It is clear that vertical retorts, in which the coal hoppers and the coke-extractors are in a direct line one above the other, are peculiarly well suited for this combined arrangement. It is, in fact, so economical in initial outlay and in working that it really constitutes an important advantage which the vertical retort system possesses over that of horizontals. For this combined arrangement, of course, only the gravity bucket system is suitable.

In many works of moderate or small size the question of introducing mechanical means of handling coal and coke has been shelved, for the reason that the quantity to be dealt with is not sufficient to warrant the expenditure of a good round sum on such plant. In some works it is possible to design a plant that will handle both coal and coke; and if this can be done, it does materially alter the whole complexion of a scheme.

Plant at Dunfermline.

Such a plant was described by Mr. Waddell, of Dunfermline, in a paper read before the North British Association in 1903. The scheme consists of trucks designed to work on three floors—the elevation of the trucks being effected by a hydraulic lift. The lowest floor enables the coke to be taken direct from a subway in the retort-house to the top floor, from which it can be shot into store, or upon a screen, prior to falling into railway waggons. On the same floor a tunnel has been constructed directly underneath the coal-stores; so that by this means trucks can be filled and then raised to the top floor for shooting into the overhead hopper which is fixed over the centre of the settings under the roof. The middle floor is used for filling the coal-stores by the trucks, which are loaded on the bottom floor from a hopper placed directly underneath the railway level, where waggons are emptied by hydraulic rams, having first been hauled along by a capstan. The whole arrangement is so well conceived as to deserve careful attention by engineers who have this question under consideration.

Mechanical Handling at the Pumpherston Oil-Works.

Generally speaking, a combination of cranes and grabs, conveyors, elevators, and telpher plant forms the mechanical handling plant in modern gas-works. But such appliances are not always the best means of doing the particular work. An excellent system of mechanical haulage of trucks is in use in the works of the Pumpherston Oil Company. Here endless chains, fitted with catches by which the trucks are elevated up steep gradients, and endless wire ropes are used for handling very large quantities of material. This arrangement would appear to be ideal for some gas-works. In the same paper the cost of handling at the Pumpherston shale-works is given; and as these figures are striking, they are reproduced:

Wages.	Per Ton. d.	*Materials.*	Per Ton. d.
Breaker men	0·16	Upkeep of haulage, chains, roads, and hutches	0·30
Retort chargers	0·51	Upkeep of engines, fans, and other plant	0·25
Retort droppers	0·51		
Tip men	0·57		
Total wages	1·75	Total material	0·55

Thus, the expenditure per ton of shale is 2·30d. This figure includes the total cost of handling the shale from the time it is delivered from the mine until it is deposited on the waste heap. As Mr. Waddell remarked in his paper, these figures are produced by plant of the same nature as our own, and as he pointed out they do undoubtedly show what a field there still remains for improvement in the handling of material in gas-works.

Wire Ropeways.

The question of cheap transport must always be an important one in gas-works. Wire ropeways, in certain cases, have much to recommend them. Where the conditions are suitable, the cost of transport by this means is distinctly cheap, the upkeep is very moderate, the power required for traction is small, while the initial outlay is, in many cases, infinitesimal. It may be of interest to mention that for many years a wire ropeway was in use at the Nine Elms works of the Gaslight and Coke Company. The ropeway was used for conveying about 25 tons of coal per hour across a dock—a distance of 450 feet between the supports. The capacity of the carrier receptacle was about 17 cwt. and the load was hauled up an incline, 1 in 19, at a speed of five miles an hour, by an engine of 6 H.P. At each end of the line was placed a hopper for filling and emptying the buckets. Three men were required to work the ropeway; and the cost of labour was said to be 0·88d. per ton, and wear and tear 0·4d., of which the ropes accounted for 0·26d. per ton. The entire cost of working, with the exception of fuel, was, therefore, 1·28d. per ton; while the initial outlay on machinery, ropes, and engine was £340. Eventually the plant had to be removed for building operations.

This is illustrative of the small expense involved in laying down plant of this type. So, from all points of view, the system is one that should not be overlooked when the question of transporting materials is being considered. Only recently, at the Southern Association meeting, it was shown by Mr. Harold W. Woodall, of Bournemouth, and by several speakers in the discussion on his paper, that in the question of cheap transport steam and motor-waggons are a factor of much importance. The figures given are strong evidence of the great possibilities of this method of conveying coal and coke.

THE "LANCET" ON GAS-FIRE TESTING.

A Physical and a Chemical Method.

In their last week's issue, our Medical contemporary, the "Lancet," devoted considerable space to the subject of "The Hygienic Testing of Gas-Fires by (1) A Physical Method and (2) A Chemical Method"—prefacing their description of the tests by the following general remarks on the subject.

However satisfactory in a gas-fire the conditions of combustion may be, it is now generally recognized that the products should not be allowed to escape into the dwelling-room. The principal products of the complete combustion of coal gas are, of course, water and carbonic acid gas, with traces of sulphur dioxide. The amount of the latter will vary according to the degree of purification effected at the gas-works. The principle of heating a room by means of the circulation of hot gases, whether harmless or not, must be rejected on hygienic grounds; and so the "bye-passing" of hot water vapour and carbonic acid gas (ignoring for the moment traces of sulphur dioxide) by a gas-fire must be regarded as a sanitary defect. The chemistry of the leakage may not be harmful; but the physics of it is certainly opposed to healthy conditions. The unhealthy and stuffy sensations experienced in the atmosphere of an unscientifically heated room are not as a rule due to poisonous gases, or even to a diminution of oxygen, but to unfavourable conditions of temperature, moisture, and flow of the air which operate against healthy respiration,

and the proper functioning of the skin. Such unfavourable conditions would be engendered by a gas-fire pouring a stream of hot water vapour and carbonic acid gas into the air of the room, when their proper means of exit should be by a ventilating flue and chimney.

We believe that, as more attention is given to this point in regard to the auto-ventilating conditions of the gas-fire, the use of gas for domestic heating purposes will be entirely free from objection. We are inclined to think, indeed, that what little prejudice remains arises largely because the construction of the stove—while it secures the more or less perfect combustion of the gas—does not provide for the complete discharge of the products of this combustion. The time has come, we think, when, in the interests of both consumers and the industry, it should be insisted that all gas-fires should not only be efficient heaters, but also auto-ventilators, without a single defect in this respect. This qualification is naturally insisted upon in the case of the coal-fire, because, if there is defective ventilation at the fireplace, the evils of a smoky chimney are at once experienced, and the smoke issues freely into the room. The products of combustion of a gas-fire are, of course, invisible gases, and their escape is not generally noticeable. Any means that can be devised to bring such products into view, so to speak, must accordingly be welcomed, because we should then be able to determine definitely whether a gas-fire is working under considered sets of conditions in accordance with hygienic requirements. When we can get quickly in possession of the facts as to defects, no time need be lost in finding a remedy; and in this matter we shall be guided by the kind of test referred to.

So far the matter of testing the hygienic efficiency of gas-fires has been complicated by the enforced adoption of elaborate methods of chemical analysis. If the escape of products of combustion into the room was suspected, samples of the air at various points (including the near neighbourhood of the stove) were caught and taken to the laboratory for analysis—chiefly in regard to the amount of carbonic acid gas present. Such a test obviously cannot be described as a ready one, and indeed it takes some time to complete. To be of practical value, a test is wanted which can be conducted, if possible, on the spot, either in the room where faulty effects are suspected or in the workshop where the stove is examined, as it should be, before it leaves the makers.

Two efforts have recently been made to provide such a test—the first depending upon well-known physical phenomena and the second upon chemical reactions. It is of interest to observe that the first test referred to has been devised by the representatives of a firm of well-known makers of gas-fires. The chemical test had for its inspiration the principle adopted in the physical test which may now be described.

The "Lancet" proceeds to describe the "Shadowgraph" test, which is already familiar to readers of the "JOURNAL," and so need not be further referred to, except to give the introductory remarks of our contemporary. They say: This test, introduced to our notice by Mr. Walter R. Twigg, of the Davis Gas-Stove Company, depends upon the fact that water is the chief product of combustion of coal gas. It is clear that, if it can be demonstrated that water vapour from a gas-fire is issuing into the room instead of flowing up the chimney, a defect of hygienic importance is disclosed, comparable with the escape of smoke from the ordinary fireplace. Everyone knows the effect of bringing a tumbler of cold water into a moist, warm air. The moisture is deposited upon the glass. This is the principle of the shadowgraph method of testing gas-fires; and when certain conditions are observed; it demonstrates clearly, as we have witnessed, the escape of water vapour from a gas-fire working defectively.

THE CHEMICAL TEST.

The "Shadowgraph" serves to furnish one method of rendering escaping gases from the gas-fire visible; the chemical method about to be described furnishes another. The "Shadowgraph" method is a direct one, while the chemical method is indirect, since it adds a constituent in very small but easily detectable quantities to the gases. It was devised in the "Lancet" Laboratory (Mr. S. A. Vasey, Director). When traces of chloroform or carbon tetrachloride are introduced into the mixture of air and gas drawn into the atmospheric or bunsen burner, the products of combustion then contain hydrochloric acid which, although present in small proportion, is readily detected by coming into contact with ammonia, forming dense fumes of ammonium chloride. At first the coal gas was passed through a bottle containing carbon tetrachloride; but it was found that an unnecessary proportion of the tetrachloride was thus taken up. Later the simpler method was adopted of soaking chalk pencils in carbon tetrachloride, removing all excess on the surface (by wiping with a cloth), and placing these near the air inlet. The result is the introduction into the air-supply of a trifling quantity of carbon tetrachloride vapour, which is ultimately converted into hydrochloric acid gas in the combustion of the coal gas, in sufficient quantity to give dense fumes when brought into contact with ammonia.

All that is necessary, therefore, in testing a gas-fire as to its ventilating function is to place near the air inlet an absorbent substance containing carbon tetrachloride. For this purpose a chalk pyramid was found to be as suitable as anything else; but in some cases it is more convenient to use an absorbent disc. All that remained to be done was to hold a test-tube or a sponge on a wire containing strong ammonia solution at different points along the canopy of the gas-fire. Any leakage or escape of combustion products is thus instantly indicated by the production of visible fumes of ammonium chloride.

The advantage of this test is that any point of leakage can be located; and, moreover, the test can be applied to the gas-fire fixed in position in the house. The test is very simple; and it should provide any gas inspector of ordinary intelligence with a portable outfit adapted to decide if gas-fires are pouring combustion products into the room, or whether, on the contrary, they are auto-ventilating.* So far as this method has been tested, it appears to furnish results in agreement with those obtained with the "Shadowgraph;" and hence it supplies a ready means of discriminating those gas-fires which allow a leakage of combustion products to take place from those stoves which do not. It is always easy to be assured of the test working satisfactorily by first introducing a metal baffle over the fire near the exit, when fumes should be produced. A small iron shovel answers the purpose quite well.

In a number of tests made by this method with some modern types of gas-stoves, the results were in some cases satisfactory, but not in all. Further, it was found that, while some old types of gas-stoves leaked very badly, an improvement was shown in those stoves which, though of recent design, were not absolutely up-to-date. This finding, we think, proves the efforts on the part of the gas-fire industry to improve the construction of the gas-stove until it complies with the most exacting hygienic requirements. Gas-stove manufacturers are now in possession of tests which promise to indicate where construction is wrong and where it can be remedied. We may, therefore, hope for the attainment of a hygienic standard which will place the system of heating by means of gas-fires on a sound basis, and remove from it a stigma which is not always deserved, but which it is well to wipe-out completely by the adoption of further improvements.

We may add that at the present moment we are undertaking an investigation with several modern types of gas-fires now upon the market, employing side by side the tests we have described. We hope to publish the results shortly. In the meantime, we think it desirable to give publicity to the tests in order that it may be open to anyone to perform them, as it is felt that in this way their merits and demerits will more quickly appear. The subject is of importance in view of the rapid growth taking place in the use of gas for domestic heating purposes.

IMPROVEMENTS IN GAS-COOKERS.

The "Rational" Patent Flueless Pattern.

A NOTE in the "JOURNAL" retrospect of the year 1913, to the effect that there had been nothing in the way of additional improvement in gas-cooker construction to record, and that Mr. F. S. Larkin had recently shown means by which ovens could be improved and rendered more efficient, attracted the attention of Mr. R. G. Marks, of Southport, who writes to say that, as the result of many months' practical tests, he has brought out, and patented, an oven which he guarantees to be without an equal in the United Kingdom.

Mr. Marks's practical work in connection with cooking by gas has been noticed in the "JOURNAL" on previous occasions; and readers will be aware that he is well qualified to judge what a cooker should be. His improved form is flueless, and is named the "Rational." There are four burners on the hot-plate (which measures 21 inches by 18½ inches); and these include a revolving grill burner. It is fitted with the well-known Marks patent heat distributor and patent meat roaster, as well as two grid-shelves and two tea-cake shelves. Mr. Marks points out that the patent enamelled crown forming the oven top retains a full percentage of top heat, and avoids any waste of gas. There are no smuts or rust in the oven; and no fixed outlet is required. The outlet, which is of very small dimensions, is in the wall at the back of the cooker; and on the oven door, near the top, a slide is fixed, to be used if required. It is found that the heat is not pulled out of the cooker, which works splendidly. As no browning shelf is needed, too, the "Rational" really provides room for an extra shelf. The stove will stand in any position; and it is fitted throughout with porcelain enamelled linings and asbestos packing. Again, he claims that the cooker, if used as advised, will not require washing out, but merely occasional wiping over with a damp cloth. In the form in which it is now made, the stove is suitable for two or four persons; but larger patterns, suitable for from four to eight persons, are in course of preparation.

As for the capabilities of the "Rational" cooker, the following tests may be left to speak for themselves. They were carried out by Mr. A. J. Harrison, the Manager of the Padiham Gas-Works.

TESTS *of the "Rational Patent Flueless Gas-Cooker" and the "Ribblesdale Gas-Cooker" as Manufactured by Francis Helm, Limited, of Padiham.*

The test took place on Thursday, Jan. 29, 1914, at the above works, in the presence of three representatives from Messrs. Helm, Limited, Mr. R. Gamble Marks, the demonstrator, and the undersigned. The

* Messrs. John J. Griffin and Sons, Limited, of Kingsway, London, W.C. have consented to construct a portable outfit for the purpose.

cookers were fixed in the workmen's mess-room, side by side, each cooker being connected to a three light meter which had been previously tested. The illuminating value of the gas was 17·2 candles, No. 2 "Metropolitan" burner, and the calorific value 543 B.Th.U., as recorded by the Simmance-Abady patent calorimeter. The dimensions of the two cookers were exactly alike—viz., width 14⅜ inches, depth 13¼ inches, inside measurement; height of door opening, 20 inches; height over all, including 7-inch stand, 41 inches. The "Rational" cooker was fitted with "Marks's" patent heat distributor and patent meat roaster, two grid shelves, two tea-cake shelves, but no browning shelf. The "Ribblesdale" cooker was fitted with the same appliances, but had in addition the ordinary type of browning shelf.

"Rational" Patent Flueless Gas-Cooker.

The oven burners were lighted at 2 45 p.m., and, with the gas-tap full on, the oven was allowed to warm up until 3 p.m. At 3 p.m., twelve large tea cakes were placed in the oven. At 3 30 p.m., the tea cakes were removed, and a small joint of lamb, weighing exactly 2 lbs. 6 oz., was placed in the roaster inside the oven, along with two 2 lb. loaves, and two bread twists. The gas was turned off at 4.15 p.m. The consumption during the whole period was 33⅛ cubic feet.

"Ribblesdale" Cooker.

The oven burners were lighted at 2.45 p.m., and, with the gas-tap full on, the oven was allowed to warm up until 3 p.m. At 3 p.m., twelve large tea cakes were placed in the oven. At 3.38 part of the tea cakes were removed, and a small joint of lamb, weighing exactly 2 lbs. 6 oz., was placed in the meat roaster, inside the oven. At 3.55 p m. the remaining tea cakes were removed, and two 2 lb. loaves and two bread twists placed in the oven. The gas was turned off at 4.22 p.m. The consumption during the whole period of the test was 41⅜ cubic feet.

In both instances the meat was thoroughly cooked, and the tea cakes, bread, and twists well baked, and browned exceptionally.

RARE EARTHS IN GAS LIGHTING.

The Hurter Memorial Lecture was delivered before the Liverpool Section of the Society of Chemical Industry, towards the end of last year; and the text has now been published in full in the "Journal" of the Society. The lecturer was Professor Fritz Haber; the subject being "Modern Chemical Industry."

The picture that technical chemistry exhibits to-day, said the Professor, is quite different from that of thirty years ago. There is more brilliancy round the accomplishment of the organic than of the inorganic industries. In his opinion, however, inorganic chemical industries can gain almost as much by regarding their problems from a physical point of view as organic industries do by the application of structural considerations; and he dealt in the lecture with one or two inorganic technical questions, laying stress on the physical considerations which bear on them. After referring to zirconium and monazite sand, the lecturer made the following remarks upon the working-up of rare earths.

The working-up of the rare earths presents many physical-chemical points of interest. It is tempting to speak of the electrolytic preparation of the so-called "Mischmetall" containing 80 to 90 per cent. of cerium (the rest consisting of didymium and lanthanum), and its use for patent lighters, or about the manufacture of pure fluorides of the rare earths used for the salted arc to make the light white, or of the special properties which a thorium nitrate must show in order to give good Welsbach mantles. I will just consider one point more in detail, because it is a good example of how the same simple consideration elucidates problems in very different branches of chemical working.

The splendid reasoning of Le Chatelier explained the property of the Welsbach mantle in producing more light when heated by a bunsen flame than any other radiator, as being due to the fact of the transparency of its substance in the infra-red region. In virtue of this transparency, the mantle is unable to give off the heat imparted to it by the burning gas by the emission of heat-wave energy. At the same temperature, the Welsbach mantle radiates no more light than other substances; but in a given flame it gets hotter, and more nearly approaches the temperature of the flame than does any other substance owing to this lack of heat radiation. From this state of things, high light economy results; and by using a compressed-air burner, we can increase the economy with the same gas.

At first sight, we may be led to think that the compressed-air flame is hotter; but on closer consideration, it will be evident that this is wrong. A bunsen flame consists of two extremely thin reaction zones, the internal cone and the external one; the latter being used for heating the Welsbach mantle. In the internal cone, the admixed air burns in an excess of gas, while in the outer cone the burning components undergo complete combustion with the air, forming CO_2 and water. The position of the outer cone is fixed by the fact that in this zone the quantity of oxygen present must be exactly the theoretical amount required for complete combustion. Here, as there is no excess of air, the temperature only depends on the calorific value of the gas and the specific heat of the products of combustion, and is therefore at the maximum attainable with this gas and air. Thus the temperature of a blow-pipe using air and gas of the same composition, cannot exceed this maximum. Nevertheless, the mantle does get hotter in the blow-pipe, as is proved by the fact of increased economy.

We do not even need this special observation of the mantle, as everyone knows, from elementary experience, that things can be heated to a much higher temperature in a blow-pipe than they can in a bunsen flame. Now, why is this the case? An explanation has been suggested in the fact that, as the blow-pipe has a smaller flame, the production of heat takes place in a more confined region. But this fact is really no explanation, as we do not heat a geometrical space, but a quantity of gas; and we have just proved that it is impossible to get it hotter than it becomes in the outer cone of a bunsen flame. To find the proper explanation, we must consider a phenomenon that has no very obvious connection with this subject—namely, the dissolving of crystals in water.

On this subject, we have the theory inaugurated by Noyes and Whitney, and developed by Nernst, which states that the layer of liquid in contact with the crystal always consists of saturated solution. This saturated layer is continually losing its dissolved substance to the unsaturated further removed layers, and at the same time being resaturated from the surface of the crystal. If the liquid is stirred, this surface layer remains without motion, as the external friction is very much greater than the internal, while the neighbouring layers have progressively increasing velocities. Now, for the sake of simplicity, we may imagine this system of layers of increasing velocities replaced by a stationary layer in contact at one side with the crystal, and on the other with the bulk of the solution uniformly moved by the stirrer. Thus, this stationary layer is a region through which diffusion of the dissolved substance takes place; and the rate of solution is determined by the amount of substance which diffuses in unit time through this layer. The quicker the stirring is, the thinner is the stationary layer, the shorter is the distance for diffusion, and the greater the rate of solution.

Bearing in mind that diffusion and conduction of heat are entirely analogous processes, and that both phenomena follow the same differential equations, we at once arrive at the theory of the blow-pipe, by introducing this simplifying conception of a stationary layer of gas on the surface of the heated body immersed in the rapidly moving gases of the flame. We see that the temperature of the solid body depends on the gain of heat by conduction through this stationary layer of gas, and upon the equally large loss of heat due to radiation. The quicker the flow of the gas, the thinner will be the stationary layer; the thinner the layer, the greater will be the flow of heat and the higher the temperature of the body. Thus the difference in the velocities of the hot gases at equal temperature accounts for the higher efficiency of the blow-pipe.

GAS FOR CORE-DRYING.

This subject was introduced at the annual meeting of the Sheffield branch of the British Foundrymen's Association last Tuesday, by Mr. John R. Hyde, in a paper on "The Application of Town Gas to Existing Core-Ovens."

The use of gas-fired ovens for drying small cores is by no means unknown; but the objections urged against its employment on an extensive scale are the large consumption of gas and the notoriously short life of the ovens. Sheffield, however, has the advantage of low-priced gas; and Mr. Hyde determined some three years ago to experiment in drying all his cores every night by gas in a permanent brick core-stove. The total weight of cores to be dried was about two tons; and calculation showed that this meant the evaporation of 42 gallons of water. The first results were not satisfactory, from a financial point of view, as it was ascertained that the gas consumed during the 13 hours that the stove was in operation cost 4s. 10d., compared with 2s. to 2s. 2d. if the work was done with coke. It was found, however, that it was not necessary to keep the gas burning the whole time, as, after running the stove up to 200° C., and keeping it at this temperature for six or eight hours, the heat in the walls and plates would be sufficient to finish the work. This meant cutting-off the gas at about two o'clock in the morning. This was done by means of a simple automatic device described by the author. It consisted of a candle and a string; the latter being released when the flame reached it. The reduction in the consumption of gas effected by this device, it was found, brought the cost down to 2s. 6d.

The author said the reliability and the evenness of drying was undoubtedly a great asset of gas firing; and each individual case must decide how far this would compensate for the extra cost. The stove was also much cleaner when gas was used; so that gas firing was a refinement which tended to remove the stigma of blackness from the trade. Big cores could be dried, without burning, by leaving them in the stove for two nights.

Mr. H. C. Sims, who has been Secretary of the Co-Partnership Committee of the South Metropolitan Gas Company since its formation, and has for a still longer period been the Chief Accountant of the Company, is about to retire, after nearly forty-two years' service. He will be succeeded in the first-named position by Mr. Walter A. S. Theobald, who has for many years taken charge of the co-partnership office under the direction of Mr. Sims.

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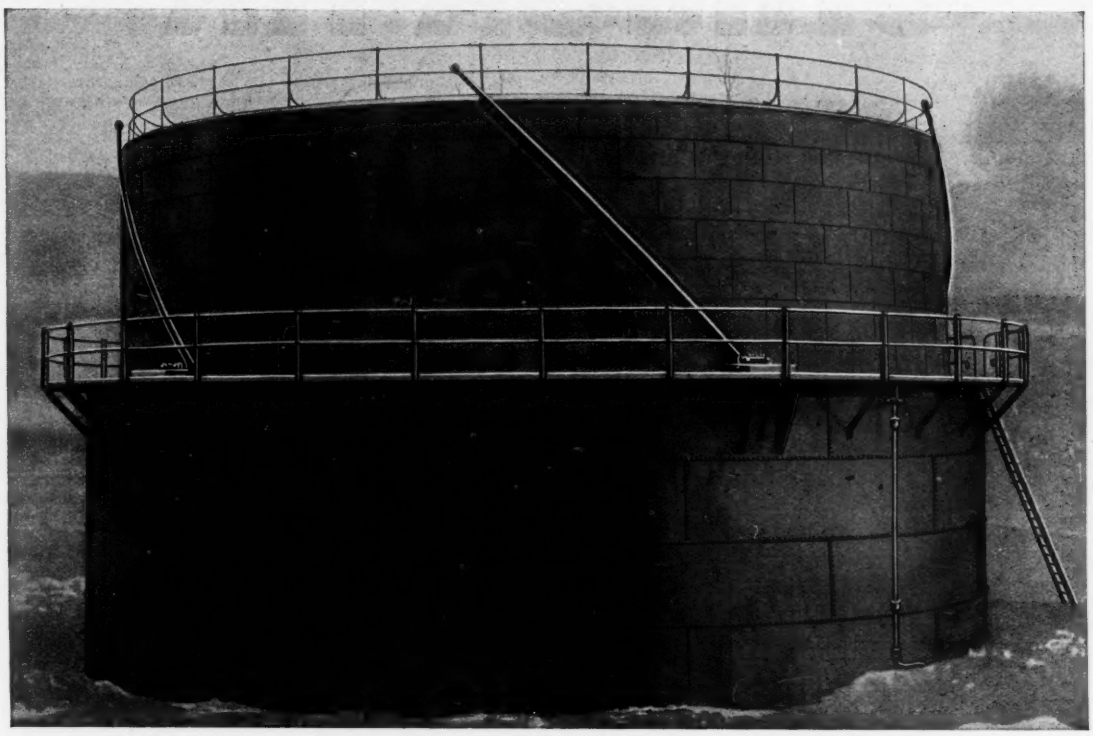

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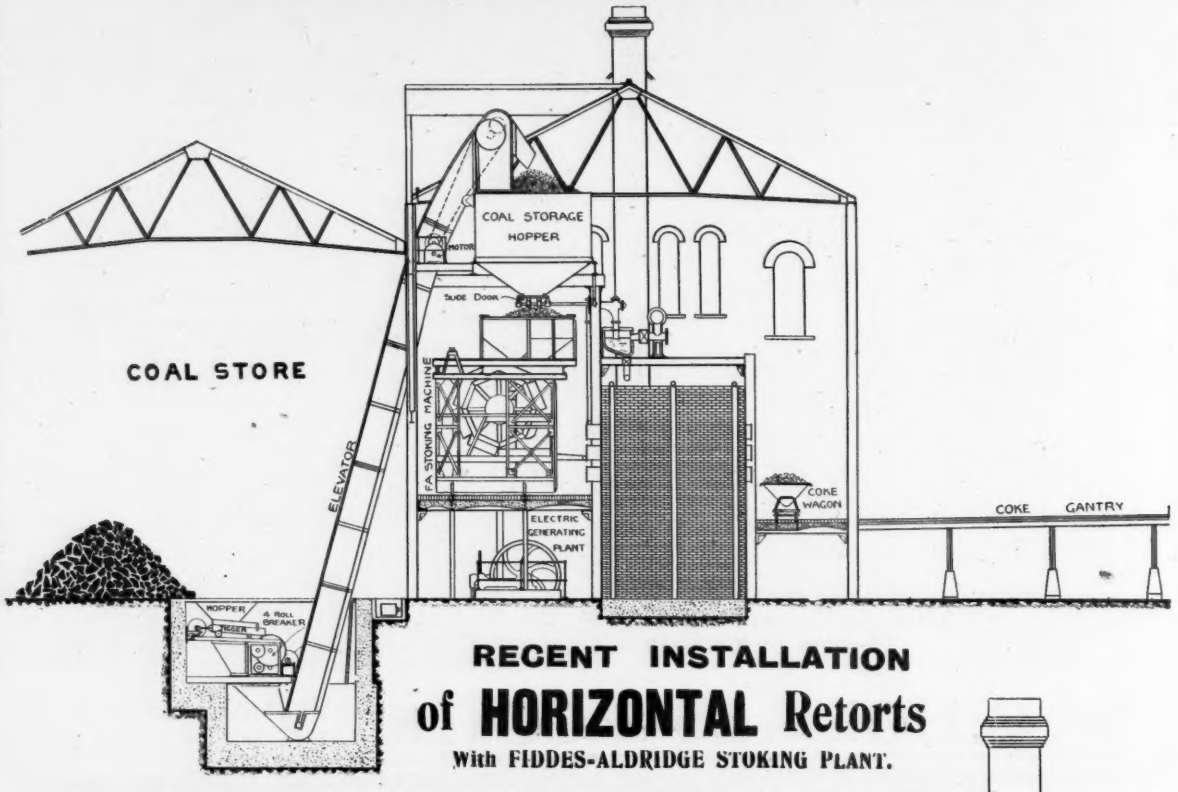

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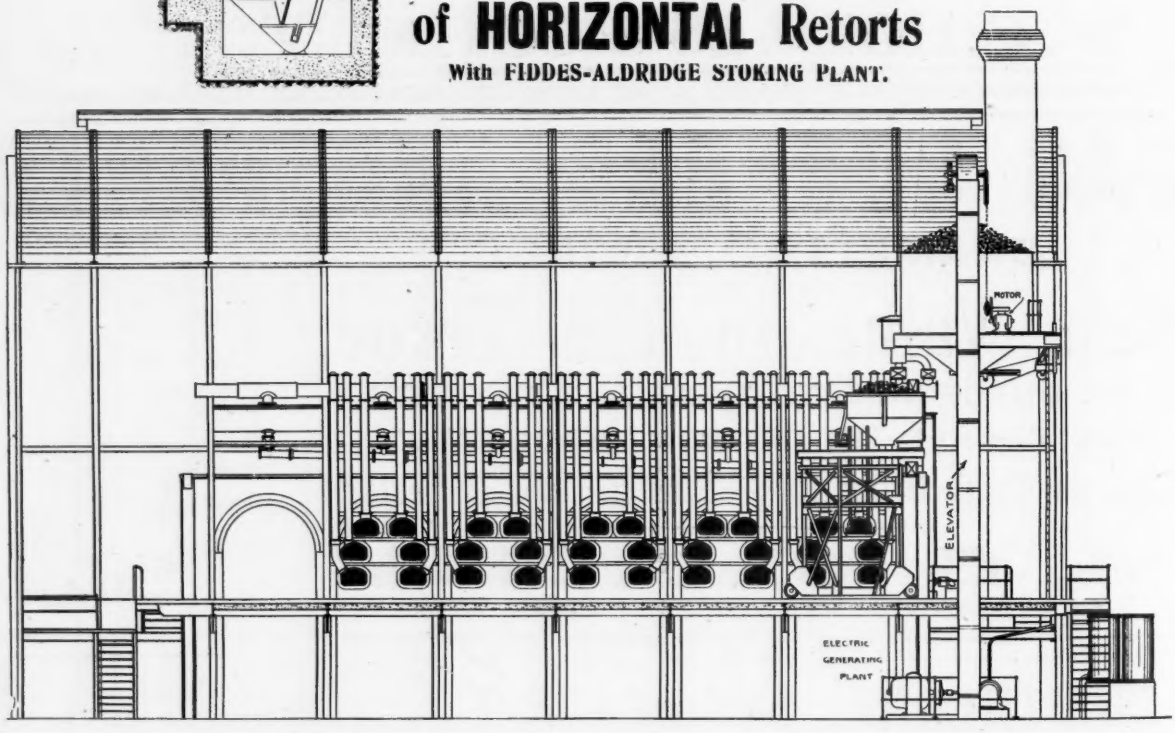

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FORTY YEARS AGO, AND TO-DAY.

The Progress of the Davis Gas-Stove Company, and of the Luton Works.

MANY of us live within the range of the very beginnings of several fortunate changes in the conditions of the gas industry. There is the incandescent mantle, and the invention to which it has given birth in both low and high pressure lighting, of upright and inverted form; there is the prepayment meter system, which has brought greater light and comfort to the mass of the people; there is the commencement of the flow of the popularity of the gas-cooker, which has reduced labour in the household, and has facilitated the preparation of meals and food in a manner undreamed of in pre-gas-cooking days; there is the production of the correctly designed gas-fire, with its perfect hygienic and high radiant efficiency, which has resulted in a new-born favour; there is the application of gas for water heating in houses and business establishments; there is the new application of the virtues of gas for numerous industrial purposes; and there are the advances in gas-engine design which have surmounted many of the difficulties encountered in the earlier types. We look back along the main avenue of the gas industry's progress; and we see the beginnings of these things and the resulting bold expansion in gas trading, which has made the industry the solid and prosperous unit that it is in the world's manufacturing and commercial work. These beginnings and these happenings have given birth to what have grown to be large enterprises and employments branched to the trunk of the industry. We have seen firms grow from a small inceptive state to concerns of immense importance and standing. We think of those now who started these firms in times within memory with much admiration for their foresight and belief in the possibilities of the industry in the directions in which they cast their lot.

IN THE PATTERN MAKING SHOP.

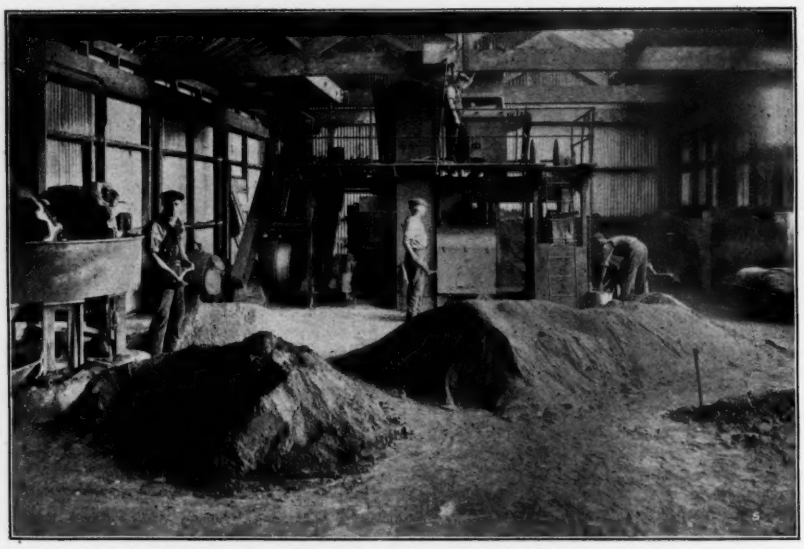
FOUNDATION AND EXPANSION.

These thoughts occur to the writer as he settles down to knit together some jottings that he made when on a visit to the Luton works of the Davis Gas-Stove Company—a visit that was the fulfilment of a long-standing invitation and promise. As the place is inspected, there is cause for marvel. The memory takes flight. It seems hardly credible that forty years have winged their way since the Company named was founded. But so it is; for it was in 1873 that the late Mr. Henry J. Davis and his brother, with Mr. H. A. Price—his cousin, and the present Chairman of the Company—started the business that, more especially in latter years, has grown to dimensions which they could not possibly have visioned in their most sanguine moments during the years succeeding the initial step. The Company was really an offshoot of the firm of Messrs. H. & C. Davis and Co.; and it was founded with an aspiration to strike out into new and specialist lines in connection with the gas industry. But those early days of the firm were ones when gas-heating practice was started, and was kept in a fairly definite rut, and when science had little part in directing design and production. This applied, as the events of the last decade or so have shown, not only to the firm whose works have just been inspected, but to other makers; and the industry, and the manufacturing firms in consequence did not effect the progress in those earlier years that they might otherwise have done. The light that science has shed upon the work of gas heating has been to the general advantage—not to the advantage only of the firms themselves, but to that of the gas industry and of the community.

However, the founders of the Davis gas-stove business in 1873 established themselves in a small way at 200, Camberwell Road. They were starting in a largely unexplored field; and so they were quite content with small works. But the time was not long coming when enlarged premises had to be secured, and adjoining property had to be taken. There are some of the handful of employees who were originally taken on who are still with the Company. There are, for example, Turner, Wilford, Goatley, and Porter, and some others have been pensioned off. These and other names rolled, with obvious interest in the recollection, off the tongues of Mr. Cyril G. Davis and Mr. Harold N. Davis, the present Joint Managing-Directors, the foresight of whose father brought them into the business, and had them trained—the one for the commercial work, and the other, in Continental foundries and at home, for the technical and works' management. These scions of the primary founder, appreciate and realize—in evidence is their hearty reference to the first hands—the good work that was done in the old days, and, in consequence, those who are still physically capable of work are with them under the altered circumstances, and those who are incapable through advancing age are not allowed to go adrift without care for their existence.

Two-and-twenty years after the firm was established—that is to say, in 1895—the expansion of the business made it necessary to break new ground. The Langley Foundry at Luton was bought; but it was not long before the available ground—then some 1½ acres—was covered. It was therefore necessary to look out for a supplementary home; and a complete decentralization of work appeared to have then been favoured; for the next purchase was the Springfield Foundry, at Falkirk. That was in July, 1900; but in five years (a comparatively brief period in the history of business making) the 2½ acres of ground at that foundry was fully occupied. With the rapid development of business came the recognition that in such productive work as the firm were engaged in, economy and works efficiency were to be realized by centralization. Experience is a good teacher; and the result was that 15 acres of land were bought at Luton. On this land probably the largest light castings business has grown up that exists south of the Midlands. Of the 15 acres, about 12 acres have already been covered with buildings; and the writer has no hesitation in predicting from what he sees there that business developments will, before many more years pass, necessitate encroachments upon the present spare space. Both the Falkirk works and the old ones at Luton are now closed. Incidentally, it may here be said that the affection of the old employees for the firm is shown by the fact that, when the Falkirk works were closed, the men were given the opportunity of continuing their employ at Luton, and some 300 of them migrated South. Much of the work carried on at the Camberwell establishment has now likewise been transferred to Luton; and there, no doubt, in course of time, the whole of the manufacturing work will be centralized. But still at Camberwell important work is being continued. Some of the large cooking apparatus is made there, the slot cookers for the London market are also turned out there, the tin-shops are situated there, and part of the enamelling work is performed there.

In the transition stages of a business, when the course of affairs is completely turned, and preparation is being made for a larger future, the chances are that a temporary change in financial fortune may be experienced. It was so in this case. But it was probably one of the best things that could have happened; for



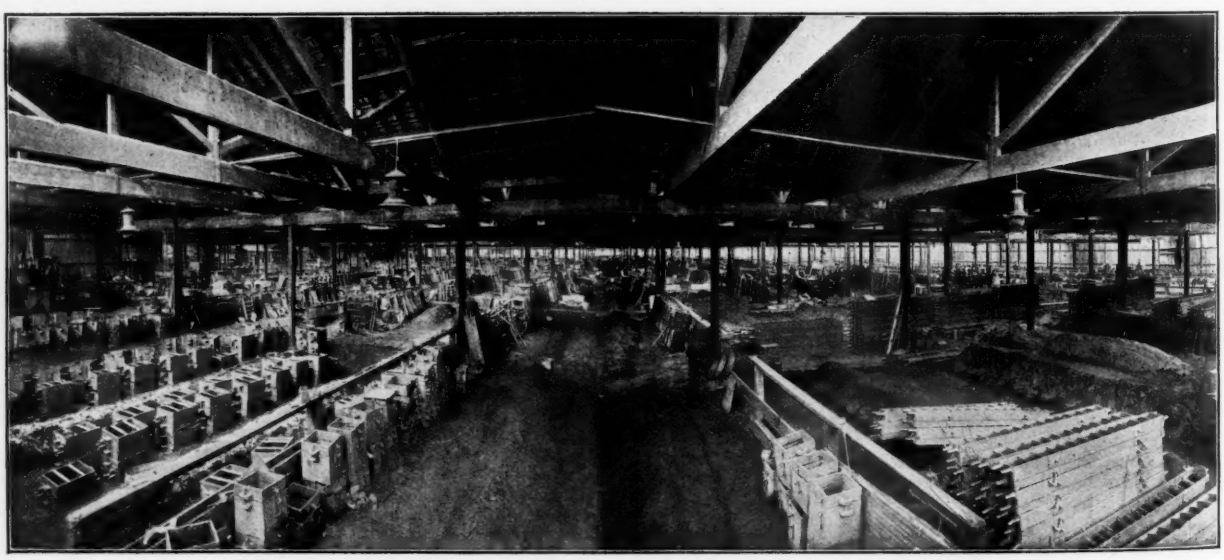
A PART OF THE SAND MIXING AND PREPARATION PLANT.

old practices were supplanted by new, and a vigorous attack was made on procedure to justify the younger members of the direction in their progressive policy. The first-fruits of the transfer to, and centralization of business at, Luton closely approached losses; and there appeared to be a feeling abroad among the shareholders that the younger members of the direction had come into the business to wreck it. These younger members pushed forward confident; the shareholders to-day smile at their own ill-forebodings. Since the transfer of the manufacturing business to Luton, on Jan. 1, 1907, the turnover of the Company has more than doubled. In 1895, when the Langley Foundry was purchased, the employees only numbered 300 to 400; whereas now they approximate 1500. All this is due to the new ideas that have been incorporated in the business. One of the first things that the new Directors undertook when they began to feel their feet was to institute a technical investigation and control department at Luton, and so to combine science with practice. As a result, the whole of the productions have been modernized, and raised to a high standard of operating efficiency. Passing through the several offices, the foundry, the various shops, and the stores, a state of works' efficiency meets the eye everywhere that does great credit to those who initiated it all. It is also noticed that the responsible men in each department are all comparatively young and energetic, and that they have had infused into them something of the spirit of the Managing-Directors (which the writer remembers as a characteristic of the father), who, while believing in discipline, also encourage a close co-operation and openness of communication and friendliness throughout the ranks. The social welfare of the men is well looked after; and an *esprit de corps* prevails among them. There is a social and athletic club, which has now been in existence some years, and in which the late Mr. H. J. Davis took almost a paternal interest. There is an institute which is used largely for concerts and recreation, including billiards. During the winter months, the hall is used for lectures by members of the staff. A list of the lectures that have been delivered during the current winter season shows the wide diversity of the interests of the lecturers outside their daily vocation. A portion of the land facing the main road has been laid out with a full-sized bowling-green and tennis courts, relieved round the sides by shrubs and trees; and here the employees will find delightful recreation during the summer months. This is all good, and in keeping with the interest that should exist between masters and employees, if there is to be mutual respect, and if goodwill is to dominate the daily work.

The expansion of the work at Luton has been spoken of, but reference has been made only to the Davis Gas-Stove Company. In point of fact, three other businesses are being carried on here, all having helpful links with the main Company. The Diamond Foundry Company is one; and, in walking round the extensive foundry, we notice that people requiring good light castings outside the gas industry are becoming more and more satisfied that there is now no necessity to go farther north for them than Luton. There is also the Diamond Enamel Company; and there again the work is not confined to the colour enamelling used for the surfaces of gas-fires. The business of the Nautilus Fire-Grate Company has also been purchased. This Company are the manufacturers of very high-class grates; and up to the present a large proportion of their goods have been manufactured abroad, but they are now being produced at Luton.

Round the Works.

Now for a rapid survey of the premises and operations at Luton. Entering the gate, there is a main roadway right through the works. On the left-hand side there are the offices, drawing office, pattern shop, and foundry. On the right-hand side are warehouses for parts, and machine, grinding, polishing, blacking, drilling, assembling, and testing shops, with a fitted goods warehouse, and out on to sidings from the Great Northern Railway.



A PARTIAL VIEW OF THE EXTENSIVE FOUNDRY.

There is also a dwelling-house, with a staff, continually experimenting with goods under household conditions. That is the general lie of the works as approached from the front entrance; but the fundamental plan of the works is such that, from the incoming raw material to the outgoing finished goods, the work takes the course of a U. The siding at which the incoming raw material is received is situated at the left-hand side leg of the U; and the work (the whole establishment is a ground-floor one) takes its systematic course, with the minimizing of the handling of the material and productions, until the goods are despatched from the siding at the end of the right-hand leg. Altogether there are between 1200 and 1300 feet of sidings.

Leaving the main offices, we take a peep into the well-lighted drawing-office, and make an examination of the busy scene in the pattern shop, where we are introduced to certain patterns of various new goods of beauty or utility or both—gas-fires and water-heating appliances—that will see the light of day in due season, and, if we can judge thus early, will be in good demand. Through a sliding-door is an extensive store where thousands of patterns old and new are kept in apple-pie order, and all duly registered and docketed so as to be available whenever required. But we pass along to witness the progress of the work from the beginning. While walking to the incoming siding, information is gathered as to how the whole of the building work was done by the Company's own men, and how in these buildings the entire procedure is now controlled by a complete card system. There was an opportunity of examining into this, and of seeing how the position of any and every job can be instantly ascertained by reference to the cards or to the record books made up from them.

The Incoming Material and Sand-Mixing.

Here we are at the part of the sidings where the raw materials are received. Stacks of pig iron are found here; and a spacious covered bay is now being constructed, so that the men can work here under cover during winter and other inclement weather. The iron is melted in two cupolas, each of which is capable of dealing with between 14 and 15 tons of iron per hour; the blast being supplied by a 65-horse power motor. The iron, coke, and limestone are carried to the tops of the cupolas by hydraulic hoists. The furnaces are of the latest approved type of construction.

An interesting feature near here is the elaborate sand-mixing plant, which has cost a considerable sum of money. The Company are strong believers in the important part played in the production of good castings by the use of the right moulding material, correctly proportioned, and thoroughly mixed for the work that has to be done. The machinery which does everything from crushing to mixing, and produces different grades of material as required, is of Continental make. It is something to the credit of foundry practice on the Continent that much more attention has been paid there than hitherto here to the treatment of moulding sands. This is the experience of Mr. Harold Davis; and the introduction of the automatic mixing plant is one result of the experience. Until a few years ago, sand-mixing machinery was practically unknown in this country; and when the Company were in possession of the foundry at Falkirk it was practically the only British one with a sand-mixing plant. The plant that has been put in at Luton is, it is believed, the sole representative of its kind in use in Great Britain. The result of the employment of this machinery, with trained men proportioning the aggregate, is a much better mixed material. It is really all scientifically done. Facing the mixer is an automatic drier, into which the mixed sand in its damp state is passed. During its travel, the moisture is eliminated; and it comes out in a perfectly anhydrous state. This studied sand preparation accounts for the excellence of the casting work done in the adjoining foundry. The different grades of prepared and dried material are kept in separate bins in readiness for use.

Core Making and the Foundry.

Contiguous to the sand-preparation department and to the foundry is the core-making department where girls (who attain a very high degree of efficiency) are employed in this delicate operation. The cores are placed on bogeys running on rails, and are so transmitted to the drying-ovens.

Passing into the foundry (which has had to be largely increased in area during the past eighteen months), the extent is striking, and the dusky far corners appear to be an immense distance from the point of entry. The dimensions are 300 ft. by 450 ft., which is equivalent to over 3 acres; and the whole of this huge space is under one roof. We fancy this is the largest foundry under a single roof in the whole of the light-castings trade of this country.

Throughout the foundry the melted iron from the cupolas is distributed by an overhead run-way, which has a lineal measurement of nearly ½ mile. The casting work that was proceeding at the time of the visit included a perfect host of varied goods—those predominating with which we are best acquainted, in the shape of gas-fire castings, cooker parts, radiator tubes, and water-circulating boilers. Outside these sections of heating appliances were lamp standard parts, engineers' castings, and numerous small things, such as advertisement and caution plates, and gauge casings. These only exemplify the variety of the work.

Cleaning and Examining the Castings.

From the foundry, the castings are taken to the dressing-shops. In passing, a special department is observed, in which, by heating, long castings which happen to be a little out of truth are straightened. Then we see the process of removing from the castings what are called the fins (*i.e.*, the rough edges) and the adhering fine sand. The operation of brushing castings to free them from sand and roughness is performed on grid-topped tables, through which, by suction, the dust is drawn away into large tubes, from which it is extracted and deposited by the operation of a powerful fan into a huge receiver outside. In organization and in improving works' efficiency, the Company are ever making advances; and this dust removal is one of the modern changes. Formerly, the writer is informed, it was almost impossible to see from one end of the department to the other through the dust-laden atmosphere; and incandescent burners were then quite out of the question. Now the men work in a pure atmosphere; and when artificial light is needed, low-pressure high-power inverted gas-lamps are used, so that the conditions are altogether wholesome and contributory to efficiency. In the next department all castings are carefully examined, optically and by tapping.

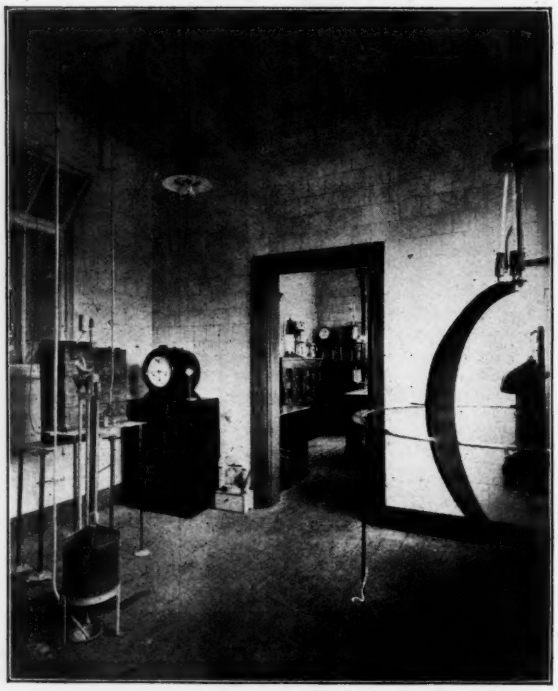
A VIEW IN THE ASSEMBLING-SHOP.

Machining and Finishing.

From the passing-shop, the castings are carried to the warehouse, which is of considerable area. The castings as they progress through the various shops are stored opposite to the shop into which they are to go next. Those that are for the machine shop are stored opposite to it. When taken from the machine-shop, they are stored opposite the grinding and polishing shops; and so on until they have been through the drilling and blacking shops. Finally, there is the stock of finished parts, all ready for treatment in the assembling-shop.

Running through the busy and well-equipped shops, in the machine shop, it is observed how everything is done on jigs, so that there is absolute assurance that every part will be interchangeable with its equal in the same type, class, and size of goods. As an example, the holes and fitting-points of every gas-fire back

are exactly identical in the same size. In short, all the modern goods are jigged, and, as far as possible, machine fitted—resulting in an almost complete standardization of parts, which is very important in contributing to economy in maintenance and repair. In the grinding and polishing shop, we see the fine, smooth surfaces given to the goods. In the blacking shop is witnessed the work that is being done by a spraying machine, which, besides being more expeditious, gives an exceedingly uniform coating—far better than could be accomplished by hand work. The next step in the forward move is the assembling-shop, where the work of fitting up the various classes of goods is being actively prosecuted. The succeeding shop is the one in which every gas appliance is thoroughly tested and regulated before passing into stock. In this testing-shop each bench is supplied with gas at four different pressures, capable of quick and easy regulation; so that tests can be carried out under any desired pressure, from a few tenths to many inches water gauge. By this means the goods passing are tested to suit the particular conditions prevailing in the district for which they are intended. The working of this shop is under the direct control of the technical department, which, in its laboratories, standardizes the tests which are to be applied, and is constantly checking the work of the stove-testing shop. From this department all the goods that have passed the ordeal of the rigorous testing to which they are exposed, are sent into the fitted goods warehouse ready for despatch. Just outside is the long siding, with, every day, its train of covered goods waggons waiting to be packed for the removal of the finished goods.



A Corner in One of the Testing Laboratories.

Before leaving this part of the descriptive work, the writer wishes to bear his personal testimony to the splendid organization that was witnessed throughout the works, and to the palpable co-operation existing between all departments, from the keen and enthusiastic heads of departments downwards. Those who have an opportunity of observation day by day can likewise bear witness to the absolute good feeling that pervades the whole of the rank-and-file of the workers. Cordiality and co-operation reign.

In the Technical Department.

One of the most important sections of the huge establishment is the technical department. Upon it a great deal of responsibility rests. It is here that all new goods are designed; it is here that all new goods are controlled throughout their preliminary stages until they are finally approved for transference to the manufacturing department. The experimental shop is in close touch with the drawing-office and pattern-shop, which are under the control of the Technical Manager. In addition to all the ordinary work in connection with the designing, construction, and assuring the high efficiency of the appliances, the time of one of the chemists is almost completely employed in analyzing raw materials—a very important factor in efficiency in every manufacturing business.

A little more detail will perhaps be interesting. There are really two distinct chemical laboratories—one of which is chiefly concerned with the technical side of the gas-stove business, while the other is devoted to analytical work on the raw materials used in both the metallurgical and enamelling departments. In addition, there are special laboratories fitted up entirely for the purpose of testing gas-fires for radiant heat and hygienic efficiency. In one department, there are three different methods for radiant heat testing. There is the Leeds test; and then what is known as the No. 1 radiometer test (as described by Mr. W. J. Atkinson Butterfield in one of his articles in the "Journal"). The third one is distinguished as No. 2 radiometer, but this has as yet only received incidental public mention. It is a water-flow radiometer; and in use it is placed at a considerable distance from the fire under test. It has quite a small area; and it eliminates the two points that have been raised against the water-flow radiometer. One is, that if the radiometer is sufficiently small to overcome difficulties which arise with the flow of water through a larger instrument, it has to be placed so close to the fire that it may interfere with the normal passage of air through the fire—thus obstructing the ventilation. On the other hand, if the instrument be of such size that it can be placed sufficiently far from the fire, so that it will not in any way obstruct the flow of air through it, difficulties have arisen, owing to the flow of water through the radiometer not being equally obstructed. In the second method, these supposed objections have been entirely overcome. It is also noticed that provision has been made for carrying out the Leeds test in conjunction with an ordinary house chimney, the draught of which can be determined at any time. Then there is the room set aside for determining hygienic efficiency by the aid of the "Shadowgraph" system. Introduction is also made to the water-heating laboratory, where provision has been instituted for the complete testing of circulators and other water-heaters—such as geysers or constant-flow and circulating appliances. The testing arrangements are such that the circulators can be connected up to a 20, 40, 60, 80, 100, or 120 gallon storage, just as is thought proper. In addition, two ordinary house circuits are in operation—one being with a storage tank located in the kitchen immediately above the circulator, and beside the kitchen range; and the other with a storage tank situated in a cupboard in the bath-room. This shows what a good range of testing can be carried out with water-heating apparatus.

A special equipment has also been made for testing thermostatic apparatus. The automatic valves that the Company make are all tested here, as well as other makers' valves—testing being for regularity of working, and for the range of temperatures necessary to operate the valves. This latter point is of considerable importance, seeing that some valves commence to gradually cut-down the gas from the time the water begins to get hot. Gas-cookers are also constantly under test in a section set apart for the purpose, in order to determine accuracy, check the manufacture, and ascertain the value of new ideas. The work of the department is thus split up into cooking, heating, and water-heating sections; and each section has a fully-qualified assistant in charge. In order to check the work of manufacture, the assistants periodically send down and take from stock manufactured goods, and pass them through a rigorous test. In this way, the technical department is constantly keeping controlling observation over the manufacturing departments, and seeing that a high standard of efficiency is maintained.

It is of interest to remark, just by the way, that one of the laboratories is fitted up with an electrical installation, so that exhaustive tests can be carried out with electric heating and cooking appliances.

The Enamelling Department.

In a former part of the article, it was mentioned that quite an independent business in enamelling is carried on by the Diamond Enamel Company, which is in direct touch with the other departments at the Luton works. The writer was very interested in the porcelain enamel work that is being conducted in the self-contained department—not only in connection with gas-fires, but with all kinds of advertising and sign work as well. Some very fine plate work was seen in course of production. The room in which the sand-blasting of plates proceeds before enamelling was inspected, as well as the stencilling-room, the brushing shop, the laboratory, and the stores. There are three large muffles in use; and enamelling work can be done from any minimum size up to plates 10 ft. by 4 ft.—and this in a single sheet. The muffles, it was noticed, are beautifully heated throughout, which is an essential to uniform work; and the information was given that the heats range from 800° to 900° C., according to the class of work that is being done.

The visit was a most instructive one; and as one looks back upon what was seen, the perfect system dominating the whole of the large establishment stands out prominently. With such a system, it should be quite impossible to have any falling back; nothing but a maintenance of works' efficiency and goods' efficiency, and advance always.

The Ford Motor Company, of Detroit, U.S.A., has just let contracts for gas-engine plant costing over a million dollars. The new plant will consist in four engines of 7000 H.P. each, as against one of 1500 H.P. at present installed. The engines, which are to be built on a new design, having both gas and steam cylinders, will be used to generate electricity for the whole works. The waste heat from the gas cylinders will generate steam for the steam cylinders. At present the Company is purchasing electricity to the value of $250,000 to $300,000 yearly from outside sources, so that the gain to the Detroit City Gas Company should be considerable.

AT THE SOUTH SUBURBAN GAS-WORKS.

Visit by the London and Southern Junior Association.

A goodly number of members of the London and Southern District Junior Gas Association on Saturday afternoon braved the wet and boisterous weather for the purpose of taking part in what they knew from past experience would prove an enjoyable and instructive visit. Their objective was the South Suburban Gas-Works; and they (or, at least, the majority of them) had been there before—just about six years ago. The Chief Engineer (who ought to know) says they are not a show works; but whether or not this be so, certain it is that they have many things to show the observant student of gas matters. If in the interval that has elapsed between the visits a great deal has remained unchanged, it is fair to assume that this is merely because it has been found incapable of improvement. The terms "efficiency, economy, and cleanliness" which were applied to the works by one of the after-tea speakers are not undeserved compliments; and they are the highest ideals that the administrators of a gas undertaking can aim at. Their attainment is, to use a popular phrase, a fact which "speaks for itself."

On arrival, the visitors assembled in the spacious, elegantly appointed, and well-fitted show-room at the works; and on entering the eye was attracted by a poster which, in simple language, makes an important appeal to consumers. It reads: "The delivery of gas coke is not affected by the weather or strikes. Orders given within will be promptly executed. Prices unaltered." After a warm welcome by Mr. S. Y. Shoubridge (the Chief Engineer), the members were divided up into parties, for the inspection of the works. The first was under his leadership; and he proved to be a veritable "guide, philosopher, and friend." Others who conducted the members round were Mr. J. W. Whimster (Chief Assistant, Mr. A. R. Griggs (Engineering Assistant), Mr. A. V. Hendrickson (Chemist), Mr. W. G. Waller (an Employee Director, and Chief Foreman of the works), and Mr. G. Ross (another Employee Director, and Foreman of mechanics). The afternoon proved too short, and the weather too inclement, for a full inspection to be made of all that was to be seen; but whatever branch of the business might be the special concern of any particular visitor, he is sure to have come in contact during the tour with something to interest him.

In the circumstances, it was a good idea not to set out with the intention of following the exact course of the manufacturing operations. The nearest building was taken first, and this happened to be the house in which is installed the machinery for pumping gas to Bromley. About 2½ million cubic feet a day are sent out by this means. The recent amalgamation scheme has entailed various alterations at other stations in the Company's extended area; and several have been relegated from manufacturing to distributing works. From this spot, a few steps across the yard brought the visitors to the inclined retort-house. There are, it may be remarked, three retort-houses in use at the works. No. 1 contains 70 inclined retorts, filled by means of the Shoubridge charging machine. This was originally a horizontal house; and the change to the present system was made when Mr. Shoubridge first took charge of the works. The retorts are 20 feet long, and 4 inches wider at the bottom than at the top. The charges are 12 cwt., and twelve-hour. No. 3 retort-house contains 26 beds of ten horizontal retorts, with De Brouwer electrical discharging and charging machinery, and a De Brouwer coke-conveyor. The coal trucks are taken over the breaker-pit, which is provided with a ram on each side; so that should the truck have a door at only one end, whichever that end may be, it can be emptied without shunting. Eight-hour charges of about 11½ cwt. are worked here; and the excellent heats of the settings were remarked upon. In No. 5 retort-house there are 186 horizontal retorts with De Brouwer stoking machinery, operated, however, in this case, by compressed air. Mr. Shoubridge does not know of a similar installation elsewhere; but he finds it works quite as well as the electrically driven machines of this type. Originally there was West's compressed air machinery in this house, which, of course, accounts for the motive power in use. A De Brouwer conveyor takes the coke from the house to an elevator and cross conveyors from which it can be loaded direct into railway trucks. The machinery in connection with No. 5 house, it will be remembered, formed the subject of a paper read by Mr. Shoubridge before the Institution of Gas Engineers in 1910.

The splendid appearance of the machinery about the works, and of the interior of the buildings in which it is housed, was commented upon. A well-kept piece of machinery is always a thing of beauty; and it is doubly so when surrounded by highly-glazed and scrupulously clean white and coloured tiles. This clean and orderly appearance was noticeable not only in the buildings, but all about the works, and, as Mr. Shoubridge truly remarked, it is a manifestation of the spirit of co-partnership. The Claus sulphur recovery plant was passed on the way to the water-gas house. The carburetted water-gas plant has during the past year only been used on compulsion—just at the peak of the load—oil being so dear that it does not pay. The two units are of 1 million cubic feet per day capacity each, on the Economical Gas Apparatus Construction Company's system; and there is provision for two other similar sets. Special attention was paid to a handsome new meter-house, which has been built by the Company's own men. This contains several station meters; and two of them are of particular interest. One, by Messrs. Milne and Son, is, after the arrangement favoured by the late Sir George Livesey, sunk in a brick tank, in which the drum revolves. There is simply a cover; the outside casing being, of course, entirely done away with. A further point is that this arrangement tends to equalize the temperature. The second meter specially pointed out was one that dates back to 1865. All these years it has been working uncommonly well; and it was placed in the new meter-house with the idea that it should continue its career of usefulness on the works. It has, however, now been sold, to make way for a larger one.

An object of much interest was the brick-making department. The Company make on the works all the fire-bricks they require. The old retorts and bricks taken out of the settings are ground up in a mill, sifted very fine, and then mixed, in about equal proportions, with new clay from the Glenboig district. When the material has been brought to a proper consistency, it is removed to the moulding-shop—which, by the way, was originally a retort-house. Some fourteen years ago, the Company started to make bricks in the arches of retort-benches. When the retorts were taken out, these were made into kilns; and a great many bricks were produced in this way. However, further accommodation was wanted; and so a large kiln of more usual form was put up. After being taken from the moulds—an operation rendered easy by the dusting of the inside of the moulds with the powdered fire-clay—the bricks are laid on the drying-floor, under which a number of heated flues run; and when they have been as far as possible dried here, they are removed to the kiln and burned. All sorts of special bricks and tiles are made here. In fact, the members were able to examine a retort manufactured on the spot. This was the result of a desire on the part of the Company to see whether they could satisfactorily carry out such work. Having satisfied themselves of its possibility, however, they did not continue the making of retorts, as it is work which calls for special skill, and takes up a great deal of space; so that unless the manufacture is continually kept up, it is not an industry that pays to enter upon. Backs for fires and crucibles for melting brass on the works are made; and the Company also manufacture their own portland cement—of a quality, too, which will stand very severe tests. At the time of the visit, only one half of the big kiln was under fire; not many bricks being required at this time of the year. The bricks are subjected in this to about the same temperature as they are afterwards required to stand in the settings—that is, about 2400° Fahr.

A nice little lesson in economy was offered when it was pointed out that all the waste-paper on the works (of which, of course, there is a great quantity) is soaked and put through a mill; and by mixing the residue with a certain proportion of fire-clay, and with hair, a very good non-conducting composition is produced, for covering steam-pipes and keeping water-pipes from freezing.

Next attention was drawn to a chamber which is utilized to burn the grease off cookers which are brought in for renovation. This is heated by a regenerative furnace at one end, the gases from which pass first round two retorts employed for barffing some parts of the stoves. These parts are placed, in three or four tiers, in the retort, on worn-out tins taken from the bottoms of cookers. They remain in the retort for about a quarter-of-an-hour, and then, when taken out and cooled, the operation is complete. A small jet of steam passes right along the retort, and the goods get a rustless coating, which is very clean, and better than any varnish. There is nothing to burn or smell, and, withal, the system is really inexpensive. Cast iron is found to take a little longer than wrought iron; but both are amenable to the treatment, as well as steel. The gases, after heating these retorts, pass to the oven, into which the cookers are run on small iron trolleys. A trolley carries twelve large cookers or eighteen small ones; and when this, with its burden, enters the oven, the door is closed; and after being subjected to the heat for three or four hours, all the grease is burned off. Enamelled linings and packing all go into the oven. All the stain is drawn out of the enamel, which is restored to quite a new appearance. The stove business of the Company is a large one; there having been sent out last year some 10,000 cookers and 5000 gas-fires. After baking, the cookers are scrubbed with a wire-brush, and wiped down with a piece of rag; and then they go to be painted. A shop in the same part of the works is devoted to the lacquering of slot and other fittings. The work done is excellent. In fact, no one would have known that the fittings exhibited were not new ones.

The inspection over, a move was made to the Livesey Memorial Hall, where tea was served, to the music of members of the South Suburban Gas-Works Band. About fifty sat down to table. Mr. Shoubridge occupied the chair; and he was supported by the officers who had been present during the afternoon's proceedings, and also by Mr. Wilfrid Wastell, the Secretary. After tea most of the visitors remained for some time to enjoy the magnificent provision that has been made for the well-being of the employees, and much praise was bestowed on all that was seen—the billiard tables, library, games room, refreshment department, the dancing floor, stage, &c.; and outside first-rate tennis courts. Dances, whist drives, concerts, and dramatic performances for the employees and their ladies are of frequent occurrence. The amateur dramatic society affords really good entertainments, and is quite an acquisition to the neighbourhood; for it has, one learns, played, and played well, both "Money" and "David Garrick"—to mention only two performances. In the main hall there hangs an oil portrait, by a local artist, of him in whose memory the Institute

was erected, and also a good photograph of the late Mr. Robert Morton, who was deeply interested in the scheme, and was present at the opening of the building. Sir George Livesey was a man who liked to help those who helped themselves; and it is on this principle that the Institute is worked. The Company find the building and light and warm it; while the employees pay a small sum weekly to provide a man and his wife to look after it. The management is entirely in the hands of a Joint Committee of the men and officers, who run the whole thing. At intervals lectures are given on technical subjects; and any young man who wishes to improve himself can find ample opportunity in the Institute of doing so.

Both tea and music having been enjoyed to the full,

The PRESIDENT (Mr. S. A. Carpenter) remarked that the South Suburban Company was a very popular one with the members of the Association. Some six years ago they were at Lower Sydenham inspecting the works; and a little more than two years ago they visited the Festival of Empire Exhibition at the Crystal Palace, when the South Suburban Company again acted as their hosts. Further, they had on their Council two gentlemen connected with the Company—Mr. S. B. Chandler, head of the Sales Department, and Mr. Griggs, who was associated with the Bromley works before the amalgamation. The works at Lower Sydenham were one of those linked with the name of the late Sir George Livesey; and they could see his stamp upon them. The hall in which they were having tea had been erected to his memory; and he believed it was built with bricks made by the Company. In going round that afternoon, they had noted the determination of the management that nothing should be wasted; and this was an excellent feature. The price of gas was low—2s. 3d. per 1000 cubic feet—and this, no doubt, accounted for the fact that there were something like 40,000 cookers in use in the district.

The SENIOR VICE-PRESIDENT (Mr. J. Hewett) proposed a hearty vote of thanks to the Directors of the Company for their hospitality, and to Mr. Shoubridge and his assistants for the welcome they had extended to them and the trouble they had taken in showing them round the works. Their thanks were, he said, also due to the band, who had added considerably to the enjoyment of the tea. Those who had braved the elements had been amply repaid by the opportunity that had been afforded them of viewing a unique works. The works were a combination of economy, efficiency, and cleanliness; and although cleanliness was not perhaps a profit-making business, it was a very necessary adjunct even to a gas-works. The provision that the Company had made for the welfare of the employees was evident in every direction.

The HON. SECRETARY (Mr. E. Scears), in seconding, endorsed all that had been said as to the pleasure and profit of the visit. They had, he added, seen a works which displayed efficiency in every part—and in some departments evinced higher efficiency and better order than they had perhaps come across in other places.

When the proposal had been put to the vote and carried with acclamation,

Mr. WALLER, on behalf of the Board of Directors, said he had the greatest possible pleasure in extending to the Association a very hearty welcome. When the Board heard that the members wished to visit the works, they were delighted to fall in with the request, and would feel more than repaid if anything of interest had been seen. The works were not show works; but they were perhaps unique in that most of the buildings had been made and erected by the Company's workmen—in fact, all except No. 2 and No. 4 retort-houses, which were no longer used for carbonizing. As to bricks, &c., the settings in No. 1 and No. 5 houses had certainly been working for a thousand days—showing that the materials they were using were of the very best. He hoped to see the members at the works again in the near future, and thanked them for their kind vote.

Mr. SHOUBRIDGE also acknowledged the vote, on behalf of his assistants and himself, and expressed his thanks for all the kind things that had been said. As Mr. Waller had remarked, it was not a show-works. It was very ordinary; but they did claim in connection with the works one thing in which they yielded to no one else, and that was in the heartiness with which they welcomed the Association when they honoured them with a visit. It augured well for the future of the gas industry that so many young men should be willing to resist the attractions of the Metropolis on a wet Saturday afternoon and devote their time to going round a gas-works, for the benefit of themselves and the profession. If this was the spirit of to-day, it was a very hopeful sign. If they had not come across any novelty, perhaps they had seen what was equally important—something to avoid. The lessons one learned in this way were certainly as useful as an inspection of new plant or processes of manufacture. They enjoyed at Lower Sydenham the blessings of co-partnership; and the state of the works, which had been favourably commented upon, was an expression of the spirit of co-partnership which animated everyone. When it became known that the Association were coming that day, all those interested in looking after the works put their shoulders to the wheel in the endeavour to make the visit as pleasant as possible. He hoped at some future time to again show the members over the works.

AN INSTITUTION JUNIOR PAPER.

The PRESIDENT, before the party rose from the tables, announced that Mr. Edward Allen, the President of the Institution of Gas Engineers, had issued an invitation to the Junior Associations of England for one among their members to read a paper at the annual meeting next June. If there was anyone present who felt able to contribute something worthy of the Institution, he would be glad if he would communicate as soon as possible with the Hon. Secretary. What was desired was something in the shape of the results of research work, or a comparison of systems, and not a description of plant. He hoped the honour of providing the reader of this paper would fall to the London Association; but he did not forget that there were very keen members in the other Associations.

MANCHESTER JUNIOR GAS ASSOCIATION.

Visit to Stuart Street Electric Power Station.

There was a capital attendance of members of the Manchester and District Junior Gas Association on Saturday, when a visit was paid to the Manchester Corporation Stuart Street Electric Power Station. Accompanying the party were Mr. Edward Allen, the President of the Institution of Gas Engineers, and several other members of the Manchester District Institution; great interest being manifested in the visit.

The party were welcomed by Mr. S. L. Pearce, the Electrical Engineer of the Corporation, together with Messrs. Lamb (Resident Engineer), Baxendale (Assistant Resident Engineer), and Davison (Engineer-in-Charge). A couple of hours were profitably spent in the station.

THANKS TO THE ELECTRICITY COMMITTEE.

At the conclusion of the visit, tea was partaken of in an adjoining schoolroom, after which

The PRESIDENT (Mr. W. L. Heald, of Preston) said that he took the earliest opportunity of expressing the thanks of the members of the Association to Mr. Pearce, and the members of the Electricity Committee, for allowing them the privilege of inspecting the generating station, and to Messrs. Lamb, Baxendale, and Davison for all the information so generously placed before them that afternoon. The visit had been educative in every way; and they thoroughly appreciated everything they had seen.

Mr. EDWARD ALLEN, who seconded, voiced similar sentiments, and asked the members to join with him in realizing how much there was in common between electrical engineers and gas engineers generally. They, as gas engineers, felt that the electrical engineers were their friends, and were not to be looked upon as rivals, but as comrades. In this connection he desired to refer to the good work done by Mr. Dudell, the President of the Institution of Electrical Engineers. They all knew gas could not do all that electricity could, and *vice versâ*. Realizing this point, then, surely it followed that a closer working between the two industries would benefit the whole world, and make it more happy and prosperous because of these good relations.

The motion was heartily accorded, and

Mr. LAMB, who briefly acknowledged the compliment, thanked the members for their appreciation. He assured them that his colleagues and himself had been delighted to have the opportunity of welcoming them. It had been their duty in the past to escort very many parties round the Stuart Street works, but none had given them greater pleasure than that afternoon's visit. He was pleased to hear what Mr. Allen said with regard to electrical engineers and gas engineers having so much in common. The popular idea was that no love was lost between them; but this was quite erroneous.

NOTES ON ELECTRICITY IN GAS-WORKS.

Mr. G. H. HAYNES, of Liverpool, then read his paper entitled "Notes on Electricity in Gas-Works." This, with some of the remarks made upon it, will be found on p. 364.

The PRESIDENT, at the close of the discussion, dealt with a number of interesting points; the ensuing proceedings being of a conversational and informal character. He proposed a hearty vote of thanks to Mr. Haynes for his paper. He said that when he succeeded to the office of President, he was very anxious that electrical matters should be brought forward for the consideration of the members during his term. Both in the visit to the Stuart Street station and in Mr. Haynes's paper they had received valuable information.

Mr. S. CARTER (Garston) seconded, and the vote was passed amid applause.

Mr. HAYNES briefly replied, and thanked the members for their appreciation. He said he desired to place on record his sincere thanks to Mr. Allen for the valuable assistance he had afforded him in every respect.

GASEOUS COMBUSTION.

Mr. Tooth's Second Lecture.

The second lecture of the series on "Gaseous Combustion," which Mr. L. F. TOOTH (of the Commercial Gas Company) is giving at the London County Council Westminster Technical Institute, Vincent Square, was delivered on Friday evening last; and those who attended had quite an instructive time. The lecture was, however, essentially of the kind which is better heard than read in print; for in large measure it consisted of a description of apparatus either exhibited on the platform or thrown by the lantern on to the screen.

Compressors and their uses were first dealt with by Mr. Tooth, who remarked that the selection of a compressor is a matter which needs attention. The horse power required, he said, for every 1000 cubic feet of gas compressed is: At 2 to 3 lbs., 1 H.P.; at 3 to 5 lbs., 1·3 H.P.; at 5 to 8 lbs., 1·8 H.P. Though rotary compressors will deliver at 8 lbs. pressure, they become inefficient when used over 5 lbs. per square inch; and the wear and tear is then very heavy. The horse power required over this pressure is also increased considerably, and gas will slip past the blades.

Therefore, for pressures over 5 lbs., it is necessary to employ compressors of the reciprocating type. For small volumes, up to 2500 cubic feet per hour, the single-acting compressor is quite useful; but for any volume over this the double-acting type is to be recommended. Air-compressors need less attention, and are generally of the rotary type, as it is seldom that more than 2 lbs. to the square inch is required—this being found to be the most economical for use with air-pressure burners. The working parts and essential features of various types of both air and gas compressors were then described and illustrated. These included the Reichelm, the Belliss, the Keith, and other makes.

Turning to another branch of his subject, the lecturer remarked that modern methods of production demanding scientific supervision and investigation of numerous processes in many fields of industry, thermometers, pyrometers, or other means of temperature measurement, have become almost universally used. He strongly recommended their employment in connection with any research work or experiments one may be about to undertake, as they save time, trouble, and expense which are often incurred by endeavouring to put into practice random thoughts. Then, again, when in practical use, if the man in charge is to have continuous knowledge of, and absolute control over, all the temperatures of importance in his plant, it must be made possible for him to obtain accurate readings without leaving his post or relying on information furnished by others.

Thermometers, Mr. Tooth continued, are used for low-temperature work, up to approximately 260° C. Almost every process of liquid boiling, confectionery cooking, low-temperature oven work, paper or plate drying, and recording temperature of flue gases, is carried out by their use. Until the introduction of the radiation and optical pyrometers, the most important types of pyrometers in use were the platinum resistance and the thermo-electric. Each had, and still has, its own field of usefulness. For continuous workshop practice, however, the temptation is to use these two types far above the temperatures for which they are constructed. To employ the platinum resistance pyrometer for temperatures over 1100° C., and the thermo-electric type for those above 1250° C., involves considerable expense in repairs and replacements of the protecting porcelain or quartz tube. The Féry radiation pyrometer is more generally known in connection with the type of instrument with two standard patterns, both of which are operated by radiant heat. But the sensitive element in the instrument varies—being in the one case a small thermo-couple, and in the other a small bi-metallic spiral. To distinguish clearly between the two types, they are known respectively as Féry radiation pyrometers and Féry spiral pyrometers. The first of these, he went on, is the more accurate instrument, and has the advantage that it can be used with a recorder, if desired; while the spiral pyrometer is cheaper and more compact.

The lecturer then followed with some observations on the use of radiation pyrometers; remarking that when using radiation, or even optical pyrometers, to measure the temperature of a crucible of molten metal, or an ingot of steel, or any body which is not inside a closed chamber within hot walls, the reading obtained will be lower than the true temperature of the body. The amount by which the reading will be low depends chiefly upon the metal and the nature of the surface of the body itself. For instance, in the case of a block of carbon it will be very little low, since carbon is what is known as a "black body;" while in the case of a crucible of molten copper with a clean surface, the reading will be some hundreds of degrees below the true temperature. In such cases, therefore, only comparative readings can be obtained. For purposes of recording the absolute temperature of molten metal, the platinum resistance, or thermo-couple, pyrometers should be used, by inserting the couple into the metal itself. With thermo-electrical pyrometers, the instrument has generally been fitted in the near vicinity of the furnace for taking readings; but means have been devised whereby readings can be taken at any distance. For example, assume ten furnaces to be working, and the process in hand to require each one to be at some different temperature, or any one furnace at a certain time to require a varying temperature. To secure accurate observations or supervision, each furnace being fitted with thermo-couples, the wire leads can be connected to one ten-point instrument, and readings taken of any furnace by the simple operation of the switch.

Among the photographs of pyrometers shown and explained, and actual specimens of the appliances exhibited (some of which were lent by the Cambridge Scientific Instrument Company), were the Féry types and the Leskole optical pattern. The use of Seger cones as a rough-and-ready method of taking temperatures was also dealt with; it being pointed out that for all practical purposes they are fairly accurate, and can be procured to record temperatures up to 2000° C.

The construction of furnaces was then touched upon. In referring to this matter, Mr. Tooth said there are many features to consider in furnace construction; points of great importance being ability to withstand rough usage and subjection to rapid raising to high temperatures. It can be easily understood that distortion of brickwork due to expansion and contraction is great, when one considers that, starting a furnace from dead-cold, it is possible to reach 1000° or 1200° C. in an hour. Yet, in construction, it is necessary to consider loss of efficiency owing to heating excessive brickwork, and also the comparatively small space required for gaseous combustion. Working with gas under pressure, or even with air under pressure burners (though the suggestion is not quite so adaptable in the latter case), if one should construct the combustion chamber of a furnace less in area than that required for correct combustion, the remedy would merely be to simply increase the pressure—thus giving condensed flame combustion, and decrease the size of the gas-injector nipples, for the consumption of gas to coincide in volume with the altered pressure.

Furnaces constructed upon regenerative or recuperative principles, Mr. Tooth told his audience, have a further advantage than higher efficiency. The passage of the spent gases or heated products of combustion through series of flues or chambers constructed between the inner and outer furnace-walls tends (by reheating the outer brickwork) to counteract any liability to undue expansion and contraction. Regenerative melting-pot furnaces are from 15 to 20 per cent. more efficient than furnaces built with solid walls; and muffle or open-hearth furnaces are more than 40 per cent. better. To obtain the increased efficiency, however, it is advisable to employ high pressure, to create more rapid combustion and give greater velocity to the gases. In some cases with low-pressure gas, sluggishness can be overcome by increasing the flue suction.

Before the conclusion of the lecture, a number of lantern slides of different makes of furnaces were shown, and the arrangements explained. At the final lecture next Friday, Mr. Tooth hopes to have a furnace in operation in the fitters' instruction shop in the Institute, so that actual temperature readings may be taken by the pyrometers he has dealt with.

SCOTTISH JUNIOR GAS ASSOCIATION.

EASTERN DISTRICT.

The members of the Association met in good numbers at the Dunfermline Gas-Works on Saturday—no doubt drawn there in the anticipation of seeing Mr. Alex. Waddell's new vertica retorts. They were not disappointed, as Mr. Waddell personally conducted them over the works and explained the points about the design of the setting, which embodies many details that are the subjects of patents taken out by him.

Meanwhile, he mentioned that, while he had tried to anticipate as many as possible of the difficulties, and to guard against them, he had expected that many things might happen which it was impossible to foresee. Happily, so far, he had had very few troubles, and he was, up to now, more than satisfied with the working. The plant is about the most simple which has yet been devised. There is the absence of that machinery which makes most vertical retorts impossible for small works. The coal is placed from the trucks into bogies with special hopper bottoms, and is raised to the required height by a hydraulic lift, in the same way as is done for the hoppers of the West manual charges, used for the present horizontal retorts, and for which the pumps and accumulator are already installed. Beyond this lift, and sundry lines of narrow-gauge rails, there is nothing beside the setting of four vertical retorts, about which we shall have something to say at a later date.

After visiting the gas-works, the members adjourned to the Masonic Hall to listen to the reading of two papers—by Mr. K. Mackay, of Falkirk, on "Foundations," and by Mr. R. M. Simpson, of Dunfermline, on "Recent Developments in Distribution at Dunfermline." Any notice of this portion of the proceedings is unavoidably left over until the next issue, in consequence of the late arrival of the first-named paper and the diagrams.

On the motion of the Chairman (Mr. R. B. Chalmers, the Senior Vice-President—the President, Mr. William Geddes, being absent through ill-health), the authors were thanked for their valuable papers. The company then adjourned to the Royal Hotel to partake of the hospitality of Mr. Waddell, and an excellent repast was enjoyed. On the motion of Mr. O'Connor, who took the chair when Mr. Chalmers had to leave, Mr. Waddell was thanked for his kindness both at the gas-works and at the festive board.

A well-spent afternoon concluded with a visit to the show-room.

Steam Raising by Coke.

At last Thursday's meeting of the Commercial Gas Company, the Chairman (Mr. W. G. Bradshaw) referred to the fact that they are deriving an economy from the use of coke, instead of bunker coal, for steam-raising purposes on their ships conveying coal from the North. Various electricity supply undertakings are becoming customers of gas-works for coke for steam-raising; and other manufacturers are testing its use under their boilers. The expert of the British Commercial Gas Association is labouring in this direction. From the last "Bulletin" of the Association, we see that Mr. S. Tagg, of Preston, makes himself responsible for the following figures, showing the pounds of water evaporated at 100 lbs. pressure per pound of fuel:—

Coke screenings through ¾-inch diameter perforations	5·0
Large screened coke	6·7
Best Arley rough slack	7·5

Mr. Isaac Carr makes an interesting point. He thinks that more care should be taken regarding the various qualities of coke. He instances the fact that he has been able to supply gas coke to iron-works for use with oven coke, and that the mixture has proved advantageous to the users. More should be made of this.

NOTES ON ELECTRICITY IN GAS-WORKS.

By G. Herbert Haynes, of Liverpool.

[A Paper read before the Manchester Junior Gas Association, Feb. 7.]

It has been my experience in many cases when I have had the privilege of being shown over the works of different gas undertakings, both large and small, corporation and company, to have noticed either a battery of boilers supplying steam through long ranges of pipework to all parts of the premises, or a number of small boilers dotted about here and there, just where required for the engine to which they supply steam. In either case there are considerable losses of power—in the first, by condensation, which more than annuls the efficiency of good boiler attendance; in the second, a number of small boilers working at a combined low efficiency—thus entailing increased labour and fuel charges. This remark applies with equal force to works which have either a moderate-sized gas-engine driving a long line of shafting, or a multiplicity of small engines with a high loss of efficiency in each engine.

In any works, centralization of power, however generated, is by all means the object to be aimed at—provided, of course, some suitable means of transmission or distribution of the power so generated can be readily and cheaply obtained. Now cheap does not mean first cost. Electricity is, one might safely say, the ideal form of power transmission and distribution. Of course, steam I suppose is necessary in a gas-works, judging by what one sees—for such purposes as clearing out tar-mains, freeing holder cups from ice, naphthalene deposits, &c.; but this could always be supplied, as is frequently done, by a portable boiler.

Prime Movers.

When it has been decided to instal electricity for driving the various machines to be put down, a matter for careful and serious consideration is the choice of prime mover. If the works possess a good steam-raising plant, favourably situated for distribution and capable of easily taking the extra load, the choice may fall on steam-engines, or even turbines; but these are as yet only experimental for small sizes. On the other hand, a works having scattered steam-raising plant, or, as sometimes happens, a works being reconstructed on modern lines, the best method would be to adopt gas-engines.

To scrap some two, three, or more small boilers, with as many engines, and instal gas-engines, generators, &c., is, I know many will say, a serious undertaking. But the economy effected, the noise, smoke, dirt, and "stand-by" losses, almost entirely eliminated, are boons which will soon make the change appreciated, and the money well spent by those responsible for the change. In some cases, it will be found that the interest on capital outlay due to the scrapping of old and the purchase of new plant, added to revenue charges, will be so large as hardly to warrant a conversion, having regard to the interest of the shareholders. At the same time, there is no question as to the proper course if starting afresh.

A method adopted at some works is to take a supply from the corporation mains; thus providing a way out of the difficulty of making such a large capital expenditure. At the same time, many corporations will not supply power to a consumer for a number of machines at medium voltage—that is, up to 250 volts direct current—they will only supply at high voltage (400 to 500); and unless one is prepared to take the extra precautions necessary to safeguard life and property according to the regulation of the Factory Act, a motor generator must be provided to transform from 500 down to 250 volts, or the voltage at which it is decided to run the plant. Again, unless favourable terms can be arranged as regards price per unit, the corporation supply will be found to be much more expensive in the long run than if the supply were generated on the premises. There will be, first, the cost and upkeep of the supply mains from where they enter the premises from the corporation supply mains to the motor-generator room; second, the transformation losses before one begins to get any power at all on the works' switchboard. Of course, if the 400 to 500 volts supply is used, there is a considerable saving effected in the cost of cables, as there will then be only half the copper necessary to convey the same power. The voltage being doubled, the current is halved; the watts remaining the same.

Installation.

After taking all the circumstances into consideration, choose a site for your power-house as centrally situated as is practicable together with cleanliness and light. Of course, gas-works are dirty places, one well knows; but by dint of a little perseverance, it is sometimes possible to find a place which would be quite suitable and yet not quite so dirty as others. Above all things, avoid as you would the plague any position in which you are at all likely to be troubled with coke dust. Coke dust blowing about and hot bearings go hand in hand. Coal dust is nothing like so harmful. Having chosen the site, build your power-house with due regard for what it is going to contain. Allow plenty of room between the machinery and the walls, also a reasonable amount of head-room; not forgetting at least a couple of steel girders along the centre-lines of plant, and, if funds will allow, one or two others on cross centres. Do not make the mistake that is commonly made, of putting down the plant and then seeing how close the engine-room walls can be built round it. If you do, you will perhaps live to see the day when, as I have seen, a wall has to be cut down in order to change the armature of one of the generators, or, again, the roof (perhaps a lean-to affair) has to be taken off in order that the fly-wheel can be lifted out of its race. A point to emphasize is that all parts of the plant on which any serious amount of responsibility rests for continuous smooth working should be duplicated.

Distribution.

It can safely be said that the electrical method of transmitting power has no rivals, especially when the points between which transmission takes place are beyond a moderate distance, and are not in a more or less direct line. The only rival worthy of consideration is by means of wire ropes. But, of course, this method is only suitable in the open, and is quite impracticable in a gas-works. One cannot help but notice the reliability with which, by means of a copper wire, power can be transmitted. The ease with which it can be carried round corners, through or over buildings, &c., demonstrates it a convenient and pliant system. In the electrical distribution of power in works in general, the main idea is to employ motors to drive the machinery; using electrical conductors to convey the power to them from the power-house. This does away with the heavy lines of shafting, countershafting, and the number of pulleys and belts connected with them. There are hydraulic and pneumatic machines in use which depend for their working upon either water or air under pressure; but there is practically no such thing as a hydraulic or pneumatic system of power distribution in works or factories. The most apparent advantages of an electric drive are:

1.—Good speed regulation for varying loads.
2.—A high efficiency at all loads.
3.—Economy in space occupied by the motor.
4.—Absence of heavy foundations.
5.—Small consumption of energy, because the demand is automatically adjusted to the load.

Shafting Drive.

The power lost in line-shafting drive with belting is usually much greater than the owners suppose. Careful tests have been made during recent years at the works of a number of industrial concerns by expert men, with astonishing results. These show that the losses due to shafting, bearings, and belting vary from 15 per cent. to as much as 80 per cent. of the total indicated horse power of the engines driving the works. In a paper read at Liverpool in 1900, it was stated that the constant loss in shafting, &c., in seventeen different workshops amounted to an average of 42 per cent. of the full load output. It must not be concluded from these figures that uneconomical working conditions prevail—a great deal depends on the nature or cycle of operations—on the total power required. The result of driving by motor is that not only the heavy shafting loss is avoided, but also that machines of smaller rated power may be employed than would be possible with a gas or steam engine, because of its capability of withstanding an overload of 50 per cent. for a short period, and even more for a momentary effort.

Cost.

Figures usually prove dry reading; so I will not trouble you with many—just a few showing the approximate cost of the several parts of motors. I may say that, in the plants with which I am, and have been, connected, the aim has been to standardize the size of motor required for the various operations, so as to avoid carrying in stock a large assortment of spare parts. By this I mean that where the power required is not the actual power of a stock machine, the next stock size larger is installed—so giving a margin of power in cases of emergency. It is far better to be over than under powered. Surplus power can always be guarded against by suitably fusing the circuit.

4	B.H.P. motor	£46	Spare arm		£19
8	,, ,,	86	,, ,,		35
16	,, ,,	125	,, ,,		56
35	,, ,,	200	,, ,,		95
70	,, ,,	350	,, ,,		140

These figures are for the principal sizes used. These machines by a well-known firm are expensive; but when it is borne in mind that the majority are all fitted with reduction gear, so that the countershaft is revolving at a comparatively slow speed, also totally enclosed (and by totally enclosed I mean dust proof, and coal dust at that—even a hose could be turned on them in any direction without fear of any harm accruing), that they will work 24 hours a day on full load, in any sort of a place, either hot or damp, which can be found in a gas-works, they are worth the money. I have had a machine of this class working on full load without stopping for 2280 hours—just over 95 days. The cost of cables would vary with the length of run, size of machine, and current they have to carry—depending on the voltage employed.

Motors.

Generally speaking, where direct current is used, there are two kinds of motors employed—the "shunt" and the "series." The mechanical characteristics of these two types of machines are quite different. Most stationary motors which are used for driving machinery are of the "shunt" type. The mechanical characteristic of this class shows it to be an almost constant speed machine at varying loads. This type of machine is not suitable

for starting-up under load. The "series" motor, on the other hand, is eminently suitable for this work; it is essentially a variable speed machine. It exerts its largest torque at the lowest speed; the speed automatically changing with change of load. Nearly all traction motors are "series" motors.

Alternating *v.* Direct.

Although most owners of factories, &c., employ the direct current system of transmission and conversion into mechanical power, there is very little to be said in its favour, and a great deal to its detriment. It is owing to the comparatively short distances which the current has to be conveyed, also perhaps to sentimental reasons as well, that direct current is used, because alternating current, being much later in coming before the public, is treated either with disdain or fear. But certain it is if polyphase induction motors had been invented 35 years ago it is extremely doubtful if anyone would now be using direct current for factory driving.

Coming to the motors—and the remarks applying to these apply with equal force to the generators—the direct current motor has a commutator and brush gear. The motor has to do its work in all sorts of positions; and when any trouble does arise, it is one or other of these two parts which are to blame in the majority of cases. The trouble may not be acute, but the possibility of collapse is always present, and is only staved-off by frequent and thorough cleaning. This is applicable to all sizes of direct-current machines. Again, the line voltage, whatever it may be, is on the moving commutator, and so cannot be effectively guarded.

Now take the case of the polyphase induction motor, usually fitted for small powers with a squirrel cage rotor (armature), which is eminently suitable for the bulk of all sorts of factory driving. There is no brush gear, no commutator—in fact, nothing except two bearings—to be looked after; also greater safety, for whatever the line voltage may be, it only goes to the standing portion of the machine, so that all connections can be completely insulated. Indeed, it was once said by a well-known man in the electrical world that the polyphase induction motor was as simple as a grindstone.

Lighting.

In regard to lighting, it is immaterial which system is employed. Except where alternating current is used, the periodicity should be kept above 40 per second. Places well suited for electric lighting are the purifying, carburetting and vapourizing, and exhauster houses—in fact, any house which contains apparatus—in case of breakdown or repair. They are places where a good light is necessary, and yet the former is usually the worst lighted portion of any works. The lighting of the various houses requires to be thoroughly well done in the first instance. Nothing but first-class material should be used, the maximum amount of care possible should be taken, the installation should be erected in strict accordance with the Factory Act, and, last but by no means least, regular, periodic, and systematic inspection of all apparatus in use should be insisted upon.

The arrangements for lighting the purifying-house depend greatly—I may say solely—on the type of purifiers in use. If they are of the "water-lute" type, with large covers, then illumination should be by means of either cargo clusters (three or five light) suspended over the box, or ordinary twin bulkhead fittings, such as are used on ships, fastened to the wall; the latter being very suitable and satisfactory. The bulkhead fitting is the better method, because it can be made gas-tight; but if the luteless boxes with small lids are used, then cargo clusters suspended over the openings are the better means, as the platform cover of the box throws the majority of the interior into shadow where the wall system is used. The weak point with the suspension method is the flexible cable, connector, or wall plug; but, as already mentioned, with the best of material and the use of a little common sense there is no danger to be feared.

The best method of lighting the revivifying floor is by means of Wells's water-tight fittings screwed direct on to the gas-barrel which protects the wires. All switches and fuses should be on the ground-floor, as near to the open air as possible. No repairs, replacement of lamps, or moving of clusters should be allowed to take place while current is on the circuit involved; there is then absolutely no danger of any arcing taking place at the contacts of lamps or connectors.

Cables.

Of the several methods of running the distributing cables from the switchboard to the motors, perhaps the best is by means of "aerials," either bare or insulated. Of these, the bare is the cheaper, and in many instances the better, provided that the cables can be conveniently run out of reach of inquisitive people. Insulated cables need only then be used from the switch or control board to the outside walls and from the finishing point of the aerial to the machine. Whenever possible, avoid putting cables underground, because when a fault occurs on the cable it is very difficult to locate its position, and equally as difficult to get at to repair; whereas aerials are always visible, and should a fault or break occur it is soon located.

Where bare wire is used, great care should be exercised in the straining-up, in order to prevent the cracking of the skin, as this reduces its tensile strength immensely, as well as providing a means by which the fumes can attack the inside of the wire. A precaution always taken by myself when erecting any new bare aerials is to coat them with red-oxide paint as soon as possible after straining-up, following this with a second coat as soon as the first one is dry. I have found this prevents any corrosive action due to fumes from the works. Any connections which cannot be treated in this manner should be carefully tinned.

Generating Cost.

The generating plant from which the following figures have been obtained, consists of two slow-speed 40 B.H.P. gas-engines, directly connected to two 27 k.w. direct current generators, through flexible couplings. The voltage generated is 220. These machines are run in parallel when required. One set runs 24 hours per day for a week on alternate weeks; the other set being paralleled-in when the coal-handling plant is in operation.

The coal-handling plant—breaker, elevator, and conveyor—is responsible at full load for 48 H.P., and is in operation on an average from 9 to 10 hours per day. The remainder of the plant consists of motors totalling 34 H.P. running intermittently for the 24 hours. This gives a combined full load for the day of 82 H.P. Although this is greater than the full-load output of the engines, practically no difficulty is experienced in doing the work, because it is a very rare occurrence to get a greater demand for current than 75 per cent. of the full load.

Generating Cost per B.O.T., Average Week.

	£	s.	d.
*Gas used, 70,000 cubic feet at 1s. 6d. per 1000	5	5	0
Attendance	3	10	1½
2 gallons of oil, at 2s. 1d. per gallon	0	4	2
3½ lbs. of waste, at 2½d. per lb.	0	0	9
Water		*nil*	
Depreciation, 5 per cent.	0	17	6
Total	£9	17	6½

Number of hours engines work = 230. Number of B.O.T.'s generated = 1900; cost per B.O.T. = 1·24d.

* The figure taken for the gas is the price into holder.

This I consider very reasonable considering the small size of the plant and the poor load factor for the major portion of the day. The average current for the week equals 51·4 amperes.

The coal-breaker is driven by two 16 H.P. motors; it is large and heavily built, as it has to cope with very large cannel, and to crush to 1½ inch cubes. It is capable of dealing with 30 tons per hour. The consumption of electrical energy works out at 1 B.O.T. per two tons of coal and cannel dealt with.

The elevator, driven by an 8 H.P. motor, is fed direct from the breaker shoot, and raises the coal to a vertical height of 45 feet. The consumption of energy is 1 B.O.T. per 4·5 tons elevated.

The conveyor is of the ordinary push-plate type, 200 feet long, distributing over bunkers 174 feet long. All the coal has to be dragged a distance of 26 feet before reaching the bunkers. The conveyor also is driven by an 8 H.P. motor. The consumption of energy is 1 B.O.T. per 3·5 tons conveyed; or the combined energy for crushing, elevating, and conveying works out at something like 1 B.O.T. per ton of coal handled. The time taken from the dropping of the coal into the breaker to its being deposited at the extreme end of the bunker is two minutes.

DISCUSSION.

The President (Mr. W. L. Heald, of Preston) said the paper was a most valuable contribution to the records of the Association; and he hoped there would be a good discussion.

Mr. J. Bridge (Stretford) remarked that he did not favour the use of electricity in purifying houses, and suggested that the author would only light up such buildings when the current was generated on the works, and not bought from the corporation.

Mr. Edward Allen (Liverpool) said it had afforded him much pleasure to listen to Mr. Haynes's practical paper. He pointed out that the cost of gas into the holder, as stated in the paper, was more than the actual cost; but he (the speaker) had given the figure to Mr. Haynes. The author had made a case for the use of electricity for motive power in gas-works, and had fully demonstrated its advantages and flexibility. He (Mr. Allen) approved of lighting purifying houses with electricity; and it was quite safe if only due care was taken. He would not under any consideration buy current for the lighting, but would only use it when generated on the works.

The Junior Vice-President (Mr. J. M'Nicholl, of Warrington) said the figures given by Mr. Haynes for loss of power in lines of shafting were, to say the least of it, astounding. A loss of 80 per cent. of the total I.H.P. seemed incredible. What percentage of the actual or B.H.P. would this represent? If the efficiency of the prime mover was (say) also 80 per cent., the whole of the power would be absorbed by the shafting. He thought the figures were rather overstated. Ability to take overload was not an unmixed blessing; for in many cases it would be much safer for the machine to come to a standstill than to be loaded beyond its designed capacity. He admitted, however, that in many cases it had its advantages. He would also like to ask why series-wound motors were used, instead of compound-wound ones. He had intended speaking about the table of costs, and especially regarding the 1s. 6d. for gas into the holders; but the previous speaker had cleared up this point for him. He did not like to think that the cost of generating should be 1·24d. per B.T.U. In his mind, this figure ought to be more like ¾d.

Mr. J. Taylor (Mossley) remarked that the paper came at the

most opportune time for him, for he at present was looking into the respective merits of electric motors. Steam on a gas-works was used for many more purposes than cleaning out tar-mains, and in his opinion it was the most economical power. On a gas-works steam was generated more cheaply than at other places. Breeze, &c., if sold, realized only a low price; but it was a very efficient fuel indeed for the raising of steam. Employing this cheap fuel, he claimed that steam was the most economical power. With reference to the costs for generating current, Mr. Haynes had not mentioned the amount allowed for repairs; and he also thought the value set-off for attendance was far too much.

Mr. Haynes said it might perhaps facilitate matters if he replied at this stage to some of the points raised. Series motors were used for traction or crane work, where they had to start-up under load. With regard to the figure stated in the costs for attendance, he desired to point out that the attendants were responsible for all repairs and working of the coal-handling plant. As to the point raised for the usage of steam power, he pointed out that losses in transmission were much greater than with electricity.

Mr. F. H. G. Goodwin (Salford) expressed the opinion that electric lighting of purifier-houses was to be desired, on account of its safety. If the wiring and installation were properly carried out, it was absolutely safe. Had the author had any experience of the electric driving of gas-exhausters? He (the speaker) considered, as he had already stated [see "Journal" for March 4, 1913, p. 600] that the exhauster was admirably adapted for electric driving. The use of three-phase transmission meant three wires everywhere; and if anything went wrong with the stator, it meant sending, as a rule, the entire machine away for repairs. Did the price of motors given in the table refer to totally enclosed motors, and of six-hour rating, and what speed of motor was allowed for? He (the speaker) preferred series motors, wherever sufficient load could always be kept on the machine to prevent it running away. Of course, a series motor must not be used with a belt-drive; for in the event of the belt breaking, the speed of the motor would reach a dangerous limit. He congratulated Mr. Haynes upon his paper, which he considered an excellent *résumé* of the subject. Harking-back to the subject of compound-wound motors, he had had considerable trouble with this type. Some years ago, he had to change the coils once a month; but he had series coils installed four years ago, and practically none of them had been taken out.

Mr. J. T. Haynes (Liverpool) asked whether the author was aware that the proprietors of one of the largest establishments in Liverpool were transforming their power from electricity to compressed air. This was also being done by another large works in America.

Mr. Haynes, replying to a question by Mr. Goodwin, said that wood was the worst foreign matter which could get into the coal-breakers. When it did get in, it was very difficult to get out, by reason of forming a pulp. The fuses in the circuit would protect the motors in case of foreign material getting into the breakers. He preferred the shunt-wound motor, on account of the varying loads which had to be dealt with in gas-works. He thought the case cited in reference to electrical energy being transformed to compressed air was to be regarded as more of an experiment than anything else.

Mr. G. H. Shenton (St. Helens) asked why the author thought it necessary to reduce from 500 to 250 volts. He was under the impression that any voltage under 660 was classed as "low voltage." He quite agreed that the polyphase system was very simple, but thought it was not suitable unless the machines were running at constant speed.

Mr. Haynes replied that a polyphase motor was no worse under a varying load than the series-wound motor would be.

The President said he was favourably inclined to motor-driven machines. If he had to lay down new plant, he would not drive the dynamo by a gas-engine, but would utilize steam as the driving power. He was forced to this conclusion by the experience he had had in the cost of raising steam; the only fuel used being breeze. Those people who were getting more than 2s. 6d. per ton for it were doing very well; but so long as they had this surplus breeze, they possessed a cheap source for raising steam, and in this respect he entirely agreed with Mr. Taylor. The coal-handling plant at Preston was driven by a steam-engine, which received its steam from the boilers near by; and, as the result of this, there was very little loss in transmission. He could not see the wisdom of spending money on regenerators and cabling, when steam power could be obtained so cheaply by the use of breeze for firing the boilers. He had had some experience with bare wires, and was of opinion that copper wires, as used in retort-houses, ought not to be stretched too tightly, but should have a small amount of flexibility. He thought it was always advisable to have enclosed motors on a gas-works; and, with regard to the question raised as to the driving of an exhauster by a motor, he would like to see one, for in this case the load-factor was constant, and good results should be forthcoming.

Gas in Saskatchewan.—Application has been made by the Continental Gas and Electric Company of Cleveland (Ohio) to the authorities at Brandon, Canada, for a thirty years' contract to supply gas in the district. If the concession is granted, the Company will erect gas-works in Saskatoon, and it is estimated that a supply will be ready within eighteen months from the signing of the contract.

SCOTTISH JUNIOR GAS ASSOCIATION.

WESTERN DISTRICT.

A Meeting of the Western District Division of the Association was held in the Royal Technical College, Glasgow, on Saturday—the President (Mr. John Wilson, of Falkirk) in the chair.

Heating Retort-Settings.

Mr. D. T. Marwick (Temple Works, Glasgow) read a paper on "The Heating of Retort-Settings;" and it gave rise to a discussion, in which the Vice-President of the Association (Mr. T. Carmichael, of Dalmarnock), Mr. G. H. M'Cowat, Mr. W. Wilson, the Hon. Secretary (Mr. David Fulton), and the President took part. Mr. Marwick replied generally to the questions raised.

AN EXPERIENCE IN DISTRIBUTION.

Mr. William Wilson (Falkirk) then read a paper of which the following are the principal portions:

Early in 1911 I was consulted by the Corporation of the neighbouring burgh of Denny in regard to the proposal to carry a supply of gas from the burgh to the villages of Dennyloanhead, Longcroft, Haggs, and Banknock; and at this point I would thank the Town Council of Denny for their kind permission to place the subject before you. Except for paraffin oil, candles, and, of course, daylight, the villages mentioned were without illumination; and though there was a gas supply at Bonnybridge, distant about a mile from Dennyloanhead, it belonged to a private firm of ironfounders, who for many years now have lit their works by gas, and also the houses of their workpeople in Bonnybridge. The firm, however, would not extend their system. It therefore remained for the town of Denny to carry out the good work, which I am glad to say has been greatly appreciated in the villages above mentioned, and has been of considerable benefit to the gas consumers within the burgh of Denny itself.

The villages form almost one continuous village street more than two miles in length, on the main road from Glasgow to Stirling, *viâ* Kilsyth; the nearest point to the Denny Gas-Works being distant about two miles. An inspection of the district reveals numerous rows of colliers' houses, two-storey tenements, half cottages, a few single cottages, with a sprinkling of shops, schools, and church halls. It is entirely a working-class district. The local industry is coal mining; and there are four collieries in operation. A canvass of the district showed that there were a possible 600 consumers; but the Town Council could only get promises from 200; and 150 of these occupied houses belonging to a coal company, who suggested that the Corporation should fit up the houses with gas. The Corporation had previously circularized the householders in the district, and offered to supply gas on the following conditions: Service-pipes to be laid free to the meter up to 60 feet; meters to be supplied and fixed free, provided not less than 3000 cubic feet of gas were consumed yearly, failing which a rent of 2s. per annum would be charged; cookers and grills to be supplied free, subject to the consumer undertaking to use gas according to the following scale:

Cost of Cooker or Grill.	Quantity of Gas to be Used. Cubic Feet.	Cost of Cooker or Grill.	Quantity of Gas to be Used. Cubic Feet.
Under £1	4000	£2	8,000
£1 5s.	5000	£2 5s.	9,000
£1 10s.	6000	£2 10s.. . . .	10,000
£1 15s.	7000		

and so on rising 1000 cubic feet for every 5s. on cost. Unless the guaranteed quantity was consumed, 10 per cent. per annum on the cost would be charged. It was desired that the fitting of houses should be done, as far as possible, by the proprietors; but, if this could not be arranged, the Council might, in case of houses let for a year or less, supply pipes and plain brackets on the footing that the gas would be supplied through prepayment meters, and that one cubic foot less would be given for 1d. The price of gas would be 2½d. per 1000 cubic feet more than was charged in the burgh, to counterbalance the gas-rate payable by the burgh consumers. The present prices per 1000 cubic feet in the burgh are as follows: Ordinary meters, 3s. 9d.; prepayment meters, 3s. 11½d.; gas-engines, 3s. 4d. If the extension was carried through, and a large additional consumption secured, the Council would probably be enabled to reduce these prices. The maximum pressure of gas available at the Denny works was 27-10ths. The preceding information was the only data on which I could commence to formulate a scheme.

I estimated that there would be a probable consumption of 6 million cubic feet of gas per annum in the district at the end of five years; and I divided this by 200—this being the proportion which our maximum daily output bears to our annual output. This showed a probable maximum daily consumption of 30,000 cubic feet. I divided this again by 5, which, in my opinion, represents the proportion that the maximum hourly consumption bears to the maximum daily consumption; and from this I worked out the size of the mains required by Dr. Pole's formula, with which you are familiar. The question of the size of main was a simple one, so far as the first two miles were concerned, as there were practically no consumers or branches on this portion. But beyond that point it was not quite so easy, as the position and

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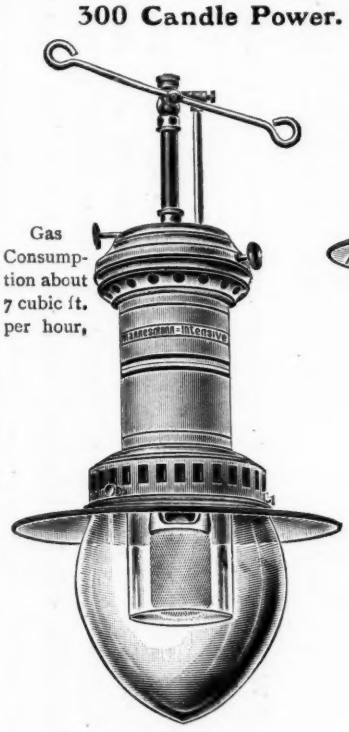

Gas Consumption about 7 cubic ft. per hour,

15538
Length over all 18 in.

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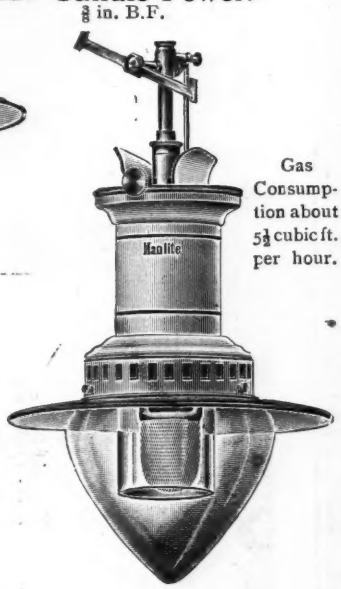

Gas Consumption about 5½ cubic ft. per hour.

21517
Length over all 16¼ in.

21567

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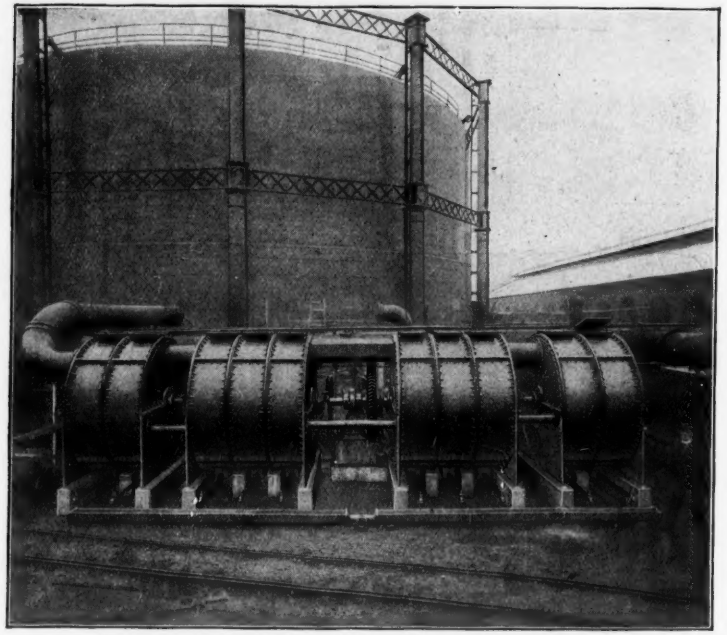

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AT PRESENT IN HAND, TWO REPEAT ORDERS FROM THE SOUTH METROPOLITAN GAS CO. FOR "WHESSOE" WASHER-SCRUBBERS—TWO OF SAME CAPACITY AS ABOVE AND THREE EACH OF 3,000,000 CUBIC FEET CAPACITY. ALSO AN ORDER FROM THE GASLIGHT AND COKE COMPANY, BECKTON, FOR TWO, WITH CAPACITIES OF 5,000,000 AND 6,500,000 TO 7,000,000 CUBIC FEET PER DAY RESPECTIVELY.

number of consumers, branch mains, &c., had to be taken into account.

The question of available pressure at the gas-works was a serious one. The altitude of the district being supplied, which is practically level, was the same as Denny, with a considerable rise between the two. One could expect little assistance, therefore, from the height of the district. I found that an 8-inch pipe would be required for the first 3300 yards—*i.e.*, the distance between the gas-works at Denny and Dennyloanhead. This would supply the required quantity of gas with a drop of 5-10ths pressure. This drop was a serious question, more especially with the low pressure available at the gas-works. I therefore went into the question of costs for an entire low-pressure scheme and of a combined high and low pressure scheme—*i.e.*, a small bore high-pressure main with compressors at the gas-works for the first two miles, delivering into larger-sized low-pressure mains in the district of distribution; and I found that there was a slight financial benefit in favour of the combined scheme. The figures are as under, and were only prepared for estimating purposes; the scheme being considerably enlarged before the contracts were fixed. The main point, in my opinion, in favour of the combined scheme was that the new district would be entirely independent of the gas-works pressure.

TABLE A.—*Estimated Cost of Low-Pressure Mains from Dennyloanhead to Banknock (Distributing Section).*

1000 yards of 6-inch pipe, at 6s. per yard	£300 0
1000 ,, 5 ,, ,, ,, 5s. ,, ,, ...	250 0
1000 ,, 4 ,, ,, ,, 4s. ,, ,, ...	200 0
750 ,, 3 ,, ,, ,, 3s. ,, ,, ...	112 10
Total	£862 10

TABLE B.—*Low-Pressure Main from Gas-Works to Dennyloanhead.*

3300 yards of 8-inch pipe, at 8s. per yard	£1320 0

TABLE C.—*High-Pressure Main from Gas-Works to Dennyloanhead*

3300 yards of 3-inch pipe, at 3s. per yard	£495 0
Twin compressors	310 0
Twin governors	85 0
12 service governors at 27s. 6d. each	16 10
Buildings	60 0
Total	£956 10
Saving in capital expenditure between Table C and Table B	£353 10
Annual saving on interest and sinking fund on above .	£21 5
Less cost of compressing—say, 3 million cubic feet, at ½d. per 1000	6 5
	£15 0

In considering the question of the size of high-pressure pipe to be required, I found that a 3-inch high-pressure main for the first two miles would deliver the 6000 cubic feet per hour with an initial pressure of approximately 5 lbs. per square inch, while a 4-inch pipe would deliver the same volume at approximately 1 lb. per square inch. The advantages, of course, of running a 4-inch pipe would be, besides less compressing, that the pipe of this size could supply a minimum demand in the summer time during daylight, at gasholder pressure, and thereby enable repairs to be executed to the governors or compressors.

I found that, with reference to the size of mains recommended in the district of distribution running from 6 inches at the governors to 3 inches at Banknock, even with the sizes recommended during the hours of maximum demand, the calculated drop in pressure, starting with 35-10ths at the governors, would be 15-10ths—that is, the pressure at Banknock might not exceed 20-10ths. The cost of substituting a 4-inch high-pressure pipe for a 3-inch one for the first 3300 yards I estimated at £660. The substitution of a 4-inch for a 3-inch high-pressure pipe, of course, increased the probable cost of the scheme, and threw the balance, so far as cost was concerned, in favour of an entire low-pressure scheme. But the Town Council were determined to give the new district the most satisfactory supply of gas possible; and they decided in favour of the 4-inch high-pressure pipe.

The Scheme Decided Upon.

The scheme, as eventually decided upon, was to lay the mains entirely of steel, with sleeve joints, in view of the undermining of the district. Compressors in duplicate were to be installed at the gas-works, and a 4-inch steel pipe laid from them to the governors (also in duplicate) at Dennyloanhead; the gas, at reduced pressure, being delivered into 1000 yards of 6-inch main, 1000 yards of 5-inch, 1500 yards of 4-inch, 1200 yards of 3-inch, and 410 yards of 2-inch branch mains—the latter having screwed joints. It was also decided to lay the service-pipes entirely of wrought-iron steam tubes, wrapped and coated; the connections to the mains being made by means of Parkinson nipples.

The specifications were prepared for the various portions of the work, and tenders received. These included: (1) The supplying and delivering of all the steel mains, service-pipes, and cast-iron specials; (2) digging and laying of same; (3) the gas-fitting of houses; (4) compressors and governors; (5) buildings. Alternative offers were obtained from contractors willing to quote overhead prices per yard for Nos. 1 and 2; and contracts were entered into for the various portions of the work.

I propose now to mention a few important points about each contract, together with a few incidents which arose in the execution of the work.

The Pipe-Laying Contract.

The first and most important contract, of course, was for the laying of the main and service pipes. The successful contractor had offered to supply British Mannesmann steel pipes throughout, and this offer was, I considered, the most favourable, as the weight of pipes offered was heavier in gauge than those offered by any other contractor. This, I believe, is not of much moment, so far as the strength of pipe goes; but it has an effect on the life of the pipe, in the event of the jute covering and Smith's solution becoming destroyed at any point. It also permits of a much more satisfactory job being made of the drilling and tapping and fixing of Parkinson nipples at the service connections. The question also of delivery and date of completion of work had a bearing in the placing of this contract, as also had the standing of the firm of contractors.

It was originally intended to have our compressors installed first of all at the gas-works, and to apply the pressure test from that point; and the mains were to be run from the gas-works. This intention had to be departed from, as, owing to a number of causes, the compressors were not in position when the main-laying contractor commenced operations. The contractor for supplying the permanent compressors provided us with a small compressing set, consisting of a gas-engine and compressor; and, on my suggestion, this engine was constructed so that it could be run, when desired, on petrol. My idea for requesting this was that, so soon as the stationary compressors were installed, we could bring them into action for testing the mains, and the contractor might then put on a second squad of men at some other point on the district, employing the portable compressor there, which would allow us to have the mains completed at a much earlier date.

Stop-valves were placed in the line of main every half mile. These were for testing purposes in the future, and they were found of great value to us for testing during the laying of the mains. We soon found that when the contractor got about a mile from the works it took a very considerable time for our small portable compressor to raise the pressure for testing purposes, and where a few leaky joints occurred the time taken extended in some cases to 1½ hours. The contractor, of course, complained about having to keep his men standing idle; and the small gas-engine and compressor were then placed upon a lorry and taken to the point at which the contractor was laying the main. Each half mile between the valves was, in this fashion, tested by itself. It was found impossible, at that date, to obtain valves and syphons suitable for high-pressure work and having sleeve joints. I therefore decided to put in cast-iron specials. These were made in every case with double faucets; and the faucets of all specials, except valves, were reduced in internal diameter to suit the steel mains, leaving ⅝-inch space for jointing.

The author then dealt with contracts, and selected a few which he thought would prove of interest. The average depth of track for the pipes was 2 feet; but this had to be exceeded at one or two points—the contractor being paid more for the extra depth. The mains were laid, where possible, in the grass verge at the side of the roadway. The service-pipes were laid at an average depth of 1 ft. 6 in., running from about 2 feet at the main to 1 foot deep at the building.

Pipe Jointing.

In connection with the laying of the mains, the manner in which the steel pipes were to be jointed with lead wool, supplied by the Lead Wool Company, Limited, was specified. The author said he was convinced that the sleeve-jointed steel mains with lead wool in the joints made the most satisfactory job. This accorded with his experience at Falkirk, where he had laid more than a mile of 3-inch main. With regard to special connections, the contractor was to place them all in the position to be pointed out by the engineer, and be jointed-up in the manner specified. On this point the contract said: "When cast-iron specials are inserted on a line of steel main, wide joints are to be expected, and such joints must be made in two portions—half the lead joint being run and then thoroughly set-up, when the final portion may be run and finished off in like manner." The author said the bulk of the trouble in securing tight joints arose through these specials.

Testing Mains and Services.

Having dealt with other clauses of the contract, Mr. Wilson gave the one referring to the testing of mains and services, which was as follows:

On the completion of each day's laying, and before the digging contractor is allowed to do any filling-in, the contractor will insert in the open end of the main a suitable plug supplied by the Gas Department, and securely joint the same, the open ends of the services being securely plugged by means of screwed plugs. The mains and services will then be subjected to an internal pressure of 20 lbs. per square inch, emanating from the compressor at the gas-works, and indicated on a suitable gauge connected to the afore-mentioned plug in the end of the main. So soon as this gauge indicates that the above pressure has been reached, the joints made on the mains and services that day must be tested by smearing them with a soap solution. Any defects, as indicated by frothing, must be immediately rectified, and as soon as all are proved to be sound the contractor may proceed with the pitching and binding of all the joints with jute canvas in the manner specified, after which the digger contractor may proceed with the filling-in of the trenches. In the case of steel mains in long lenths, the digger contractor may be allowed to fill in such parts of the trenches as come between the faucet holes; but on no

account must any joint on the mains or services be covered over until it has been thoroughly tested and passed by the inspector.

The pressure of 20 lbs. per square inch will be sealed in the mains and services and remain so overnight. The plug must on no account be removed until the inspector has examined the gauge on the following morning, and found that during the night there has been no appreciable drop in pressure as indicated thereon. Should any marked drop be noticed, the plug must not be removed until the source of leakage has been discovered and rectified. To enable the contractor to locate any such leakage, the main will again be subjected to pressure. On the defects being discovered and made tight, the main will be once more sealed off for a period of not less than one hour. If the gauge during this period shows no appreciable drop in pressure, the contractor may then proceed with the work. To facilitate testing, valves will be placed on the main at intervals of half a mile.

This testing clause, said the author, is really most important; and I am convinced that it is the proper thing to do in all cases now. Our first day's test was, to say the least of it, an eye-opener, as not one joint proved tight. The jointers then saw what was required of them, and soon remedied matters. The work proceeded smartly until the first two miles of 4-inch high-pressure pipe were laid as far as the governor-house at Dennyloanhead. Immediately after commencing the 6-inch low-pressure pipe, however, a difficulty arose through the impossibility of the contractor obtaining delivery of the tubes for the service-pipes. We were therefore faced with the alternative of suspending the operation of main laying until such time as the service-pipes could be delivered, or proceed with the main laying independent of the service laying. This was finally agreed upon, on the understanding that the services would be tested later on. The contractor held, however, that it was unfair to subject the mains again to a pressure test after having been already passed; but, as it turned out, no leakages whatever had developed at the joints on the mains when we came to test the services—showing the efficiency of the jointing. The mains were therefore laid to a finish, and tested before the bulk of the service-pipes were commenced.

Mains and House Fittings.

The author then gave the following particulars of the lengths of the various sizes of pipes laid; Under the original contract, the sizes of mains were: 1000 yards each of 6-inch and 5-inch, 4300 yards of 4-inch, 750 yards of 3-inch, and 410 yards of 2-inch. There were to be 5000 feet of ¾ and ½ inch services. Some of the 6-inch and 5-inch mains were not laid, and there were additional 4, 3, and 2 inch mains, and 1½, 1¼, 1, and ¾ inch services. The total, including the amount for the additional depth of trenches above 2 feet (extending to 4 feet), and extras, was £2220 17s. 7d. The author proceeded to deal as follows with the contract for fitting the houses. Tenders were obtained for fitting the 150 houses definitely promised. These were nearly all room and kitchen houses on the ground floor. The method of gas-fitting one of these houses as detailed in the specification was carried out as follows: The service-pipe (average length allowed 6 feet) was run in of ¾-inch wrought-iron tube, finished with a ¾ inch by ½ inch reducing coupling, a ½-inch service coupling with ½-inch compo. to the meter. [The meters were provided by the Corporation, and were prepayments; and free grillers were also supplied.] From the meter ½-inch compo. pipe was run exposed on the wall up to the ceiling, with holdfasts every 15 inches, and round the cornice to above the mantelpiece, where a ⅜-inch branch was dropped to supply a flexible tube cock at the mantelpiece end, and a ¼-inch branch was laid to a stiff bracket of good quality fixed in the centre of the mantelpiece. A ⅜-inch pipe was run from the ½-inch pipe to above the room mantelpiece, and a ¼-inch pipe was dropped there to supply the room bracket, which was fixed to a polished mahogany wood plate on the wall. The contractors submitted an alternative slump price per room and kitchen house for carrying out the gas-fitting according to the specification, and eventually 16s. 6d. per house was accepted.

After the work was commenced, applications for gas supplies came crowding in, so that the extent of this contract greatly exceeded the original amount contracted for. In all, 527 houses were gas-fitted. This extra number of consumers also considerably delayed the work of the service-laying contractor. In the case of this contract, prices had also been obtained from the contractor per foot for running iron service-pipes; and it was found more convenient, in the case of a number of two-storey tenements, to run the service-pipes for the upper floors of iron pipe outside the building. All these two-storey houses, and a number of houses of three and four rooms and kitchen, were charged for extra in proportion to the room and kitchen houses; and this meant the contractor was paid a considerable amount of extras. The average price per house for gas-fitting worked out at 17s. 5d.

Compressors and Governors.

I now come to the question of compressors and governors. The compressors were in duplicate, of the rotary and exhauster type, each capable of passing per hour 6000 cubic feet of gas of sp. gr. ·45, against a pressure of 5 lbs. per square inch, while running at 110 revolutions per minute. It was originally intended that each compressor should be coupled direct to, and fixed upon, the same cast-iron bed-plate as a horizontal steam-engine; but this was departed from on finding that there was at the Denny Gas-Works only one boiler available for supplying steam, which required to be knocked off for a few days each summer for cleaning and inspection. It was therefore arranged to have one of the compressors driven by a gas-engine. No difficulty whatever was experienced in the laying-out, connecting-up, and starting of the compressors, which had given no trouble whatever. The connections consist of inlet and outlet screw-down isolating valves at each compressor, and an automatic bye-pass, which will open in the event of the high pressure failing at any time, and allow the gas-holder pressure to pass right through to the new district. There is also an excess pressure valve, which is connected to the inlet and outlet mains; this being of the nature of a safety-valve. In the event of the pressure of gas on the discharging side of the compressors exceeding that required, this valve will automatically open, and allow gas to return to the main inlet and so relieve the pressure.

I come now to the governors, which are placed at Dennyloanhead, and reduce the high to the low pressure. The governors are of 4-inch size, and are in duplicate, having isolating valves for each set and also a bye-pass. The connections are of 4-inch bore, and the main outlet is increased immediately next to the governors to 6-inch bore, to suit the first section of the low-pressure main. The governors are of the diaphragm type, and each set consists of two, reducing the pressure by two stages from high to low. They perform their functions admirably. In the governor-house a high-pressure mercury gauge is fixed, and also a low-pressure water-gauge. Similar high and low pressure gauges are placed in the compressor house at the gas-works. The two compressors, boiler, and exhausters are in charge of the leading stoker.

The High-Pressure Supply.

The few houses on the route of the high-pressure pipe are supplied through small service governors. The largest of these services supplies a number of cottages, and a large tenement; the connection to the high-pressure pipe being of 1-inch bore, passing through the service governor into a 2-inch main service pipe, has branches to the cottages and tenement. The other services are all ¾-inch throughout. Each service governor is fitted with a ¾-inch bye-pass, with isolating stopcocks and union couplings. A small wrought-iron syphon pot is placed on the service-pipe next to these governors on the low-pressure side, as the services in every case rise to the premises supplied. There is also fixed to these service governors on the low-pressure side, a mercury seal which will blow to the open air in the event of the governors going wrong, and the pressure rising above 6 inches water pressure.

Cost and Result of the Scheme.

The cost of the whole scheme worked out as follows:—

	£	s.	d.
Mains and services	2220	17	7
Gas-fitting houses	605	0	0
Meters	872	10	8
Grillers	214	14	4
Compressors and governors	322	0	0
Buildings	109	5	1
Special connections at gas-works	39	1	7
Extras—inspector's wages, legal expenses, engineer, &c.	282	14	9
Total	4667	4	0

In conclusion, I may say that it has been a most successful scheme from every point of view, as only on one occasion has a leak developed on the system; and the financial results are such as have enabled the Denny Town Council, notwithstanding a 50 per cent. rise in the price of coal, to make the substantial reduction of 5d. per 1000 cubic feet of gas, not only to their own consumers within the burgh, but also to the consumers in the new district. The make of gas has also increased from 14,872,800 cubic feet in 1911 to 23,067,600 cubic feet in 1913; and there are to-day in the new district 619 consumers, 566 of whom have prepayment meters. There are on loan 468 grillers and 79 cookers. As a result of this scheme being so successful, the Town Council have gas-fitted about 200 houses within their own burgh, thereby further adding to the sales of gas. The make of gas this year will reach 26 million cubic feet.

The paper was illustrated by maps of the district served (showing the line of the mains), diagrams of the pressures, and photographs of the buildings containing the compressing plant.

DISCUSSION.

Mr. Alex. Wilson (Glasgow), in opening the discussion, said the paper would be greatly helpful. He was very much taken with the remarks regarding the gas-rate in Denny. It showed some people meeting their difficulties, and, by paying off their debt in time, being enabled to do much better work afterwards. Referring to the question of smoke abatement, he remarked that if a rate were given by the city in the same way as they gave one for sewage, they might lower the cost of gas to the consumers, and enable them to use more for heating and cooking purposes, and in this way help to clear the atmosphere. He thought Mr. Wilson was right in advising his Corporation to go in for work on the high-pressure system. The idea of having valves for testing purposes in the half-mile was a very good one. Did Mr. Wilson take the precaution with these valves to seal them and lock them up, and prevent interference with them? The whole of the paper bristled with figures such as they did not often get in an address delivered to a Junior Association; and when they came to be printed in the "Transactions" they would benefit everyone. The value of a practical paper such as the one before

them was always more felt afterwards than on the night of a meeting.

Mr. J. Bell (Kirkintilloch) said in his own district they had increased so rapidly that in the outlying parts the pressure was very weak. They were faced with the custom of a larger supply; and he was in doubt as to whether or not to adopt a high-pressure system. He did not agree with Mr. Wilson in having so many different sizes of mains, as difficulty arose when they had to be repaired. He also objected to going lower than a 3-inch main in any part of the district. They started with a large main, and as they went out the pressure diminished and the mains decreased. He thought it should be the other way—as the pressure diminished the mains should increase.

Mr. Frazer thought the paper was one of the best that had ever been given to the Association; but he criticized the method described of jointing-up all the special traps.

The President thought the most interesting part of the paper was the pressure test; and they should all keep it for future reference. It certainly achieved its purpose in the outlying district, because the mains there were absolutely tight. If they could possibly test all the mains they laid before turning on the gas, he was sure their leakage accounts would go down with a run.

Mr. Wilson, in reply, said it was a little off the beaten track for gas undertakings to do wholesale gas-fitting to houses, and also to have a contractor laying service-pipes. Gas corporations and companies preferred to do the work themselves. No special precaution was taken with regard to the valves, except a key arrangement. Of course, any malicious person could cut off the section; but he did not anticipate this. It seemed, on the face of it, that there were a good many sizes of mains; but he thought it would be a great waste of money to lay a 6-inch main where a 3-inch one would be ample. The thing was to have a good initial pressure. He liked Mr. Bell's point about the pressure diminishing and the size of the mains increasing. Theoretically this was right; but practically it was *non est*. Mr. Frazer spoke about jointing the special traps. He might say that the arrangement of jointing was only carried out at the valves. He did not know where he culled the idea from—whether from Mr. Hole's book or from Mr. Woodall, of Bournemouth. He was struck with the good sense of the idea; and it had turned out exceedingly well with them.

Hearty votes of thanks were accorded to both authors for their papers.

GAS-WORKS PRODUCTS AS MOTOR FUELS.

At last week's meeting of the Society of Arts, Mr. W. R. Ormandy, D.Sc., F.C.S., M.Inst. Automobile Eng., read a paper entitled "Motor Fuels, with Special Reference to Alcohol," in the course of which he made detailed allusion to the possibility of gas-works residuals forming an alternative solution of the trouble getting daily more acute—the provision of a reliable, and yet fairly cheap, substitute for petrol.

In the early part of his paper he pointed out that in the year just past, in this country alone, 20 million gallons more petroleum spirit were used than in the preceding year; and this in spite of the efforts which have been made to press the sale of coal-tar spirit, of which, undoubtedly, some millions of gallons have been employed. A professor at an American University has calculated that that country's requirements for motor spirit must be somewhere in the neighbourhood of 1500 million gallons per annum. It is very difficult now to form any reasoned judgment upon the consumption of motor spirit in America, because, quite independent of motor-cars, the number of which can be approximated, large quantities of spirit are used for internal-combustion engines employed in small industries, and to an enormous extent in agricultural operations. We may reasonably assume a consumption of 300 gallons per annum per car, which would give an increased consumption of 150 million gallons in one year from the cars produced in that year. This is something like 500,000 tons of petrol; and assuming the figure given in Professor Vivian B. Lewes's book on oil fuel, that, taking the world over, possibly 10 per cent. of the world's production of crude oil would be formed into motor spirit, we have here a requirement for an extra output of 5 million tons of crude oil per annum to meet this one increase in the market. It is a fairly safe assumption to make that at present the world's demands for a volatile liquid fuel are growing at a rate with which the output of crude oil is not keeping, and cannot keep, pace. It is quite true that new fields are being developed in various directions; but it is equally true that the old fields are becoming exhausted. For the last two or three years new supplies have little more than balanced the failing wells; and the number and depth of wells in the old fields to-day to give a certain yield are scores of times the number of those employed in the early days. It is just possible, though unlikely, that some of the new fields may prove rich enough to supply the growing demands for a limited number of years; but it is not likely that the production will keep pace with the growing demand for any length of time—the ever-growing price, not only of motor spirit, but of lubricating oil and lighting oil, and, consequently, of crude oil, is sufficient evidence of this.

Substitutes for Petroleum Spirit.

It behoves us, then, to say what substitutes are available. The number of possible fuels known to chemists is almost illimitable; but the number of those which can be produced in such quantities as those with which we have to deal is remarkably small. In the first place, the most obviously applicable material is that produced on the distillation of coal, known as benzene. The nature of the spirit produced during the distillation of coal depends so much on the class of coal, the temperature of distillation, and the conditions under which it is distilled, that we can hardly refer to the product as any one substance. Under the ordinary conditions of gas-works, as carried on to-day, the spirit consists chiefly of benzol and its homologue, toluol. But where vertical retorts are used, the spirit produced consists largely of paraffinoid bodies more resembling petroleum products than what are known as benzenes or the aromatic group. This, for the purpose of our inquiry, is quite immaterial; and we will speak of the spirit produced by the distillation of coal as "coal spirit."

The oldest, but by no means the largest, source of supply is from the gas-works. There are produced from the distillation of coal in this country round about a million tons of tar per annum; and on the distillation of this tar a little over a gallon of benzene is produced per ton distilled. It is quite obvious that benzene must be considered not only as a bye-product, but as one of minor importance among bye-products. In the past, practically the whole of this output of spirit was employed in the varnish, paint, and rubber trades; for the extraction of fats; and in the manufacture of organic bodies, chiefly dyes. It is quite clear that the production of coal spirit from gas-works will be conditioned by causes with which the motor industry has nothing whatever to do. There is a growing tendency towards the utilization of coal gas for heating and cooking, as well as for lighting; and this conditions the gradual but steady growth of the gas production of the country. It has been proposed to take out the benzene which exists in coal-gas, and which is actually necessary to the coal gas to give it the illuminating power which, by law, it must have.

Enthusiastic, but misguided, people have urged that the lighting standard for coal gas should be swept away, and a heating standard introduced in its place. I refer here, of course, to the misguided people who desire to have the lighting standard removed in order that the benzol out of the gas may be recovered and used for motor-fuel purposes, and not to those connected with the gas-manufacturing industry, who desire the same end for entirely other reasons. It has been estimated that if the whole of the coal gas of this country were so stripped of its benzene, 20 million gallons per annum would be placed upon the market. What the people who advocate such a step do not realize is that the introduction of the new standard would permit of such modification in coal-gas manufacture as might, and would, probably lead to the production of another type of gas entirely, and one out of which it might not be possible to recover any volatile spirit whatever. Higher temperature and larger yields would become the order of the day; and, unless Parliament imposed limitation on the carbon monoxide content of the gas delivered to the consumers, water gas would be employed in ever-larger quantities. In order, however, to bring the gas to the heat standard which would certainly be required, it would be necessary to leave in all the available benzene and paraffin-like bodies, since these are not only light givers but the most concentrated heat yielders. I think one may assume that the stripping of illuminating gas of its volatile liquid constituents would in the end prove no advantage to the motorist, and might even deprive him of some of the fuel which he at present obtains.

Bye-Product Recovery Coke-Ovens.

A newer but much larger source of coal spirit is from the bye-product recovery coke-ovens. A ton of coal coked in such an oven will yield anything from 1 to 4 gallons of coal spirit, according to the nature of the coal and type of oven employed. Assuming 2½ gallons per ton as an average production, the maximum which we can look for from this source would be very little over 30 million gallons per annum; and this figure could only be arrived at by producing the whole of the metallurgical coke used in this country in bye-product ovens. The table below shows the growth of hard-coke production in Belgium, and indicates that the average yield of coke from bye-product ovens was 76·5 per cent. of the weight of coal employed. Probably in this country very similar figures would be obtained.

	Tons.	
1908	2,307,990	= 76·5 per cent. coke average.
1909	2,962,922	
1910	3,110,820	
1911	3,160,950	
1912	3,186,780	

The supply in 1912 having been produced from 4,166,400 tons of coal, it is interesting to note that the average yield of coke in Belgium was approximately 76⅝ per cent.; and this figure alone is sufficient to demonstrate how this product must of necessity control the progress of the whole industry.

Clearly the question as to whether coke-ovens will be built or will be worked is primarily a question as to the relative value of coke compared with coal. In other words, bye-products are what their name implies, and must play an inconsiderable *rôle* in the great economic questions controlling their production.

This is neither the time nor the place to go into details regarding either the production of benzene from coal in gas manufacture or in the manufacture of hard coke; but it will be of some interest to glance at the incidence of one or two new movements on the problem which interests us. Many gas-works employ a subsidiary plant, utilizing their own coke for what is known as water gas—a

cheap product, practically non-luminous and containing so high a percentage of the dangerous gas (carbon monoxide) that only a limited quantity has hitherto been employed for admixture with the coal gas. This blue gas, as it is called, must be enriched in order to give it the requisite illuminating power, and also to bring the blue gas to the necessary heat value. This enrichment is carried out by the utilization of oil, which is injected into the furnace in such a manner as to cause it to be split up into permanent gases, or vapours carried along by the gas. The growing demand for oils in other directions is sending the price up to such an extent that in many cases it does not pay to use enriched blue gas; and, in consequence, larger amounts of coal are being distilled to give the extra amount of gas hitherto supplied from the water-gas plant.

A secondary consequence of this has been a slump in the price of gas-works coke. Not only is less coke used because the water-gas plant consumed large quantities, but more is being actually produced to the extent of that brought on the market by the additional coal necessary to replace the blue gas, the manufacture of which is now discontinued. The increase in the price of oil may be said to be more or less directly responsible in bringing the price of gas-works coke down to between 8s. and 9s. per ton free on rails. Many other problems which break new ground are being considered in the gas profession. In Germany the bye-product coke-ovens have actually displaced municipal gas-works. Improvements in coke-oven construction, the regenerative oven, enable a large proportion of the gas produced to be available for purposes other than the heating of the ovens themselves. Such gas may have the benzene taken out of it and be employed in the works for power generation in gas-engines or steam-raising under boilers, or the benzene may be left in and the gas sold as ordinary illuminating gas. At the point where the value of the gas for illuminating purposes exceeds its value in the works, it is a commercial proposition so to dispose of it; and if this limiting price be lower than the lowest price at which a gas-works can afford to distribute a similar product, the community gains by employing the bye-product gas for illuminating and heating, but the motorist suffers by the removal of potential fuel from the market.

The following table (showing the growth in the sale of bye-product gas for illuminating purposes in the Ruhr district of Germany) points out what progress is being made in this direction on the Continent:—

	Gas Sold.
1908	400 million cubic feet.
1909	850 ,, ,, ,,
1910	1,500 ,, ,, ,,
1911	3,000 ,, ,, ,,
1912	5,600 ,, ,, ,,

It will be seen that the output is almost doubled every year.

The Birmingham Corporation have installed bye-product ovens to provide hard coke for the local metallurgical industries; the gas being added to the supply obtained from ordinary retorts.

A further suggestion is to consume cheap slacks in Mond gas-producers; employing the gas so produced for heating gas-retorts in the distillation of coal, and presumably mixing as much of the Mond gas with the coal gas as its low heat-value may permit. This would again throw large quantities of coke on the market, since coke is chiefly employed at present for the heating of gas-retorts.

Finally, the proposal has seriously been made that on the removal of the lighting standard for coal gas, the coal shall be distilled and gasified in special types of producers, enabling a somewhat poorer quality of gas to be made at much lower prices than the gas to which we are accustomed.

At the first glance, many of these suggestions and improvements seem remote from the subject of this paper, but they are introduced with a definite object—namely, to emphasize the fact that the development of the coal-distillation business is proceeding, and will proceed, along lines of least resistance, and that among the deciding factors the question of the production of motor spirit is of such minor importance as to be quite negligible.

Low-Temperature Distillation Processes.

Much work has been done on processes for the distillation of coal at reduced temperatures. It has long been known that under such conditions large yields of volatile liquid products are obtained; but until a process is discovered where the yield of volatile liquid products is so high that it may be considered to be the main product, and the coke and gas regarded as bye-products, so long will the development of such processes be primarily dependent on the development of markets for the special coke and gas produced. Quite independent of the difficulties connected with the development of new markets, the capital which would have to be employed in low-temperature distillation processes on a large scale is so enormous that it is inconceivable that products from this source should even keep pace with the increased demand for liquid fuel from year to year, still less produce for us in such quantity as would enable it to exert any appreciable influence on the market price of its competitors.

Many of the large collieries and some of the gas-works are experimenting continuously with such low-temperature distillation processes; and we may rest assured that the knowledge of the value of a successful process is sufficient to induce every effort to be made to bring such processes to fruition.

I have said nothing about the suitability of these coal spirits for use in the present type of internal-combustion engine, because it has long been known, and is, indeed, obvious from the physical properties of the materials, that they can be employed with trivial alteration on the carburetting side. It is, however, unfortunate that in some directions the point of view that benzenes in the near future might be expected to be produced in such quantities as to influence the economic situation in the liquid fuel market has been unduly emphasized. Neither the motor manufacturer nor the using public is likely to inquire very closely into the accuracy of statements which are put before them with an air of scientific certainty. It is quite time that some strong representative body was formed to inquire into all aspects of the fuel question. Both the using public and the manufacturers should be told the actual position of affairs. They should be made to realize the danger of their position, if, indeed, the position be dangerous. We should settle—so far as such things can be settled—whether, in fact, we may look to coal products as a relief from the difficulty induced by shortage of petroleum products.

For the reasons briefly mentioned above, and many others which time prevents being dealt with, the speaker still takes up the standpoint which he occupied in 1904—that none of the sources so far discussed are likely to be capable of meeting the world's growing requirements for a volatile liquid fuel.

New Possibilities.

There is always the possibility that a new raw product may be discovered from which a suitable material may be produced, and indeed, Dr. D. T. Day, the Chief of the Geological Survey of the United States, has announced to a meeting of the members of the Franklin Institute that a substitute for petroleum, having all the properties of a first-grade oil, has been manufactured by the staff of the Geological Survey. Like all fuels hitherto suggested, this would seem to be derived in some manner from material which has been stored during innumerable ages in the history of the world; and it is rather to products which can be produced, as it were, out of revenue that we must look with certainty for help in the future.

Alcohol.

Of materials which can be produced from organic matter, capable of being produced year by year, ethyl alcohol is the only one which seems to offer satisfactory possibilities. Just as a cursory examination of the physical properties of coal spirit enabled us to say that it could be used in the place of petroleum spirit, so a knowledge of the physical and chemical properties of alcohol points to the necessity for a closer study before an opinion can be expressed as to its suitability for employment to replace the bodies above referred to. In dealing with a new prospective fuel there are two questions of almost equal importance: Can it be used? And can it be produced cheaply enough and in sufficient quantities? The concluding portion of the paper dealt with this question, with which, of course, "Journal" readers have no special concern.

In conclusion, the author said: Does the mature consideration of the motor world, manufacturer, and user, and of the various committees of motor societies, lead us to believe that the petrol supply cannot keep pace with the growing demand? I think this question can be answered in the affirmative. Our Chairman [Sir Boverton Redwood, Bart.] is the highest authority on this particular subject, and he has stated this to be his opinion. Is our coal supply likely to yield sufficient alternative fuel to make up the deficiency and to prevent prices still getting higher? In my opinion there is not the slightest doubt as to the inability of this source of supply to do what we require of it. Then what are the alternatives? The Committee of the R.A.C. have admitted that alcohol would seem the only alternative if petrol and benzene fail us; the Motor Union Fuel Committee came to the same conclusion; and the Imperial Motor Transport Conference have confirmed this decision with no uncertain voice. The motor trade of this country is said to employ close upon half a million hands. The societies connected with the sporting aspect of the motor industry have incomes running into six figures. Surely, if these are convinced that the fuel upon which their whole existence depends is failing, they will do all that is necessary towards providing a substitute.

A Lighting Exhibit in New York.

A correspondent sends to the English "Illuminating Engineer" some particulars of an interesting demonstration of good and bad methods of illumination which was carried out by the American Illuminating Engineering Society at the International Exposition of Safety and Sanitation in the Grand Central Palace, New York, in December last. The exhibit took the form of a series of eight booths, each devoted to some specific branch of lighting, and illustrating the fundamental rules of good illumination. It is stated that the display attracted a considerable amount of attention. To many people it was a revelation to find that good illumination, besides being intimately connected with industrial safety, also plays an important part in artistic and architectural matters. The first booth was illuminated with artificial light corresponding in colour to average daylight. It was used for matching and selecting coloured material. The purpose of the second booth was to show the effect of glare from glazed paper on the ability of the eye to see. In the next four booths, school, shop window, and factory lighting were shown. In the seventh booth examples were given of four methods of room lighting in common use; and the last booth contained an exhibit illustrating the remarkable difference in the appearance of objects lighted from particular directions. The exhibit has been placed in the American Museum of Safety.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Retort Arrangements at the Gloucester Gas-Works.

SIR,—I have read with much interest, from time to time in the "JOURNAL," the excellent contributions by "Modus Operandi." In your issue of the 3rd inst. he deals with the presidential address which I delivered to the members of the Midland Association on Feb. 20 of last year, and asks for further information on certain matters.

I will first deal with his remarks concerning the use of brick retorts where power stoking machines are in use. Since the summer of 1906, we have used West's combined charging and drawing machines, which deposit the full charge of coal in the retort at one operation. Our retorts, which are Ω's, 24 inches by 16 inches, have now been in actual working for 1394 days. They are still sound; have kept their shape; and no settlement has taken place in the settings. The retorts are kept free from carbon deposit; and up to the present no damage has been done to them by the machines.

With reference to the remarks made concerning the conversion of the hydraulic seals to anti-dips, I have pleasure in fully describing the arrangement, which is as follows: I have retained the Bryan-Donkin hydraulic main weir-valve, which is now worked fully open, and cut off 4 inches from the dip-pipe—dispensing with the old bridge pipe and inserting a butterfly or throttle valve between the ascension and dip pipes. This valve is operated from the floor of the retort-house by means of a rod attached to a counterbalanced lever on the valve spindle; the valve rod having a hook at the bottom, which engages with another rod running at right angles along the retort-bench. On releasing the hook, the valve is immediately closed by means of the counterbalance weight.

The cock at the bottom of the hydraulic main, which was connected to a tar-main for the purpose of flushing the hydraulic previous to conversion, is always left open. If the cock should become blocked, the tar and liquor which would accumulate would do no harm, as it would rise up in the hydraulic to the level of the weir-valve, and flow away without causing any trouble, as the shortened dip-pipes would still be a few inches above the tar and liquor level in the hydraulic.

With reference to stop-end retorts, my reasons for preferring them are fully explained in my address.

W. S. MORLAND.

Hempsted Gas-Works, Gloucester, Feb. 6, 1914.

Church Lighting.

SIR,—The upright mantles which I saw at St. Bartholomew's, Smithfield, on Aug. 24 last, and described in my letter of Jan. 21 as "evidently experimental," were fixed in place of the flat-flame burners just above Charlotte Hart's pulpit, on the north side of the body (chancel) of the building. I made no reference to any elsewhere.

Probably, if Mr. Benham did not see them, they may have been removed to allow the flat-flames a longer lease; but I and many others interested most sincerely hope their removal is not in order to make way for the introduction of electric lighting, which to my mind is entirely unsuitable for the purposes of the building. Will no gas lighting expert come forward to the rescue?

A. L. DUNPHY.

Feb. 9, 1914.

Sulphate of Ammonia by the "Moore" Process.

In the "JOURNAL" for Jan. 6 (p. 30), an extract was given from an article in the "Chemical Trade Journal" regarding the recovery of sulphate of ammonia by the "Moore" Gas-Producer and Bye-Product Recovery Plant. In this paragraph, a statement was made that "with the Mond process 40 to 44 kilos of sulphate of ammonia is recovered per ton of fuel, while with the Moore process the yield is 36 kilos."

The Dowson and Mason Gas Plant Company, Limited, of Glasgow, point out that with the "Moore" plant the amount of sulphate of ammonia recovered is at least equal to that obtained with the Mond process. Further, with their process not less than 0·5 lb. of steam per pound of coal gasified is obtained from the water-jacket, so that the amount of extraneous steam necessary to saturate the producer blast is about one-third of that required with any other system. A pamphlet which our correspondents forward gives the results of a test carried out last June at Manchester, where the yield of sulphate of ammonia was 41 kilos per ton of coal gasified, when only 1 lb. of steam was used per pound of wet coal gasified.

Limerick's Electric Light Deficit.—The Local Government Board for Ireland have intimated to the Limerick Corporation that sanction cannot be given to a proposed loan of £1576 to enable the Council to meet a deficit on the working of the electricity undertaking which has been the subject of much contention.

Gas-Fire Hygiene.—Last Tuesday evening, a lecture on this subject was given at the Central Gas-Works, Greaves Street, Oldham, by Mr. W. R. Twigg, head of the Technical Department of the Davis Gas-Stove Company, to the members of the Oldham Gas Students' Association. In the course of his remarks, the lecturer referred to the "Shadowgraph" method of testing gas-fires for hygienic efficiency, and gave a very interesting demonstration of the test as applied both to fires of high and low hygienic efficiency—showing the marked improvements that have been made recently as the result of careful consideration of the scientific facts governing the correct construction of gas-heating stoves. The lecturer described, by means of slides, the points in the construction which have to be carefully considered if a gas-fire is to give satisfactory results and a high standard of hygienic efficiency. After the lecture an interesting discussion followed; and a hearty vote of thanks was given to the lecturer—proposed by Mr. Tim Duxbury, the Gas Engineer, and seconded by Mr. A. Cummings.

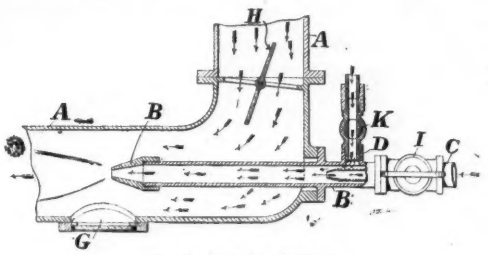
REGISTER OF PATENTS.

Producing Heat by the Combustion of Gaseous Fuel.

GARE, T., of Wembley.

No. 652; Jan. 9, 1913.

This device for producing heat by the combustion of gaseous fuel consists of a burner supplied with a mixture of gas and compressed air in a conduit supplied with a current of compressed air; and it has for its object "to so arrange the burner and air conduit, and the gas and compressed air supplies in relation to each other, that larger quantities of hot air and of a higher temperature, with less quantity of gas, can be produced than hitherto has been the case."



Gare's Injector Burner.

A pipe A, the inlet end of which is connected with (say) an air pump or blower, and the outlet end with the apparatus to be heated, has a burner B arranged centrally in it, and connected to a pipe C leading from a fan or equivalent means (not shown) and having a branch pipe D for the inlet of the gas.

The gas inlet is some distance behind the outlet orifice of the compressed air outlet C, so as to cause the gas to be drawn forward injector-like; and the orifice of the burner, being located a considerable distance in front of the compressed air outlet orifice, provides a chamber for the thorough mixing of the gas and compressed air.

The pipe A is of considerably larger section than the burner B and burner supply pipe C, and has a closable opening G, furnished with a door to facilitate the lighting of the gas mixed with air issuing from the burner B.

The two air-pipes may be supplied with air by one fan only, or by separate fans or equivalent means; and a throttle valve H and taps I and K are provided for controlling the quantity and pressure of the air as well as the gas supply each separately.

Gas-Producers.

WHITFIELD, C., of Sydenham, S.E.

No. 1117; Jan. 15, 1913.

This invention relates in particular to producers designed to deal with light fuels—*i.e.*, fuels, the non-gaseous and dust-like products of which are liable to pass with the gas and choke the passages leading to the point where the gas is required, This is said to be especially so in the case of light fuels of a bituminous or tarry nature, and where the producer is worked by the suction stroke of an engine.

According to the invention (as applied to a producer the outlet of which in plan converges down from a large to a comparatively small size and is fitted with a junction box), a pipe is connected to the box which at its lower end dips into an ordinary settling tank. The part of the pipe next the box is of smaller diameter than the lower part; and at the junction of the parts of smaller and larger diameters is a conical nozzle, by means of which (forming as it does a restriction) the pulsation action of the suction of the engine on the gas in the producer is checked. In the part of the pipe connected with the junction box is a water-supply jet by which the sides of the pipe and nozzle are kept constantly washed, and thus relieved of any tar, &c., that may tend to lodge in the pipe.

In order to further check the pulsation action of the suction of the engine on the gas in the producer, a rotary tar-extractor is used which also acts as a fan to draw and pass forward a supply of gas which is always available for the engine, thus relieving it of the necessity of drawing the whole charge in the time occupied by the suction stroke. The construction of the tar-extractor preferred forms the subject of a concurrent patent—No. 1118 (see below). The extractor is mounted to work in connection with a tank, fitted with a partition and provided with inlet and outlet orifices.

Gas-Washers or Tar-Extractors.

WHITFIELD, C., of Sydenham, S.E.

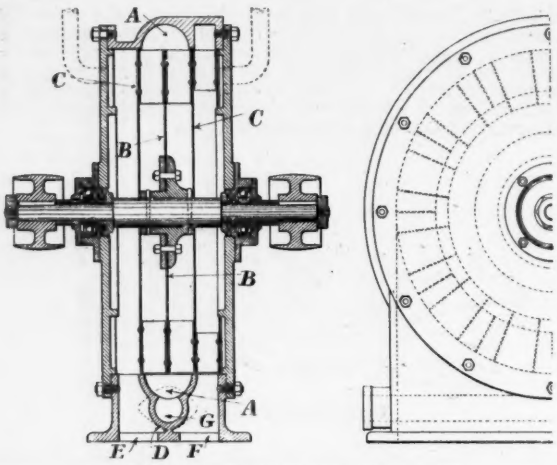
No. 1118; Jan 15, 1913.

These gas-washers or tar-extractors comprise a rotary fan (provided with a series of passages formed by radially disposed vanes) which, upon being rotated, effects the removal of impurities from the gas; while an auxiliary fan upon the same shaft as the main fan is for the purpose of causing or assisting the passage of the gas through the apparatus. The present invention relates to, and consists of, the construction, arrangement, and combination of parts, and the application thereof.

As shown (p. 372) by the section and end elevation, the tar-extractor consists of a circular box-like casing having a circumferential channel A similar to that of a centrifugal pump. Within the casing is a fan composed of a central disc B and a series of sheet-metal vanes on each side of the disc, which vanes radiate from the centre to the periphery of the disc. On each side of the fan and at the outer ends of the vanes is a sheet-metal ring C—each ring, in conjunction with the disc and vanes,

forming a series of passages which come opposite the circumferential channel A in the fan casing.

Upon one side of the fan is another, but smaller, disc and further vanes—these latter and the disc constituting a separate fan or propeller, and being on the outlet side of the larger fan. At its lower part the fan casing is divided by a vertical partition D into two passages E F; one forming the inlet and the other the outlet to the fan casing.



Whitfield's Gas-Washer and Tar-Extractor.

On the fan being set in motion, the gas is first drawn through the inlet passage C into the fan casing; then passed into contact with the vanes on one side of the large fan, which fling it outwards and through the passages at the edge of the fan into the circumferential channel A. On the gas reaching the outer edge of the disc B, it is drawn by the smaller fan through the passages on the other side of the disc and finally delivered through the outlet passage F. Any tar in the gas is thrown into this channel, whence it escapes to a suitable receptacle, *viâ* the outlet passage G.

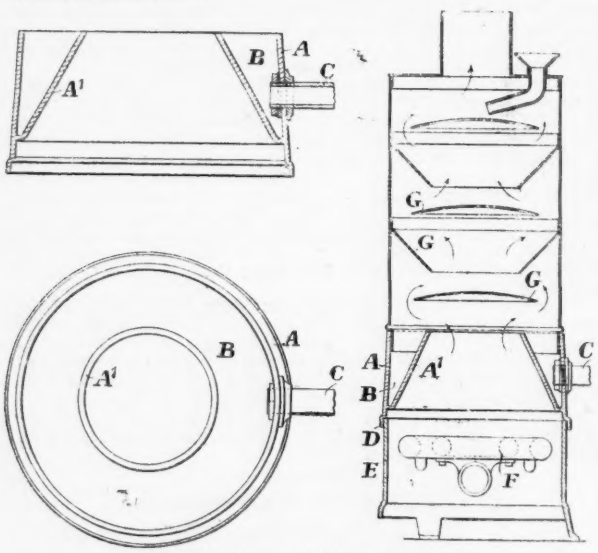
During the passage of the gas through the extractor, jets of water may be delivered through pipes on to the fan on both sides; the water passing along with the gas and helping to remove the tar.

Direct-Heating Geysers.

TOWNSEND, W. W., of Hereford.

No. 5078; Feb. 28, 1913.

This invention consists in forming the water-chamber as a separate detachable unit, so arranged that its outer wall forms the outer wall of the part of the geyser immediately above the stand or burner chamber, and is connected with the body of the geyser above and with the stand by simple socket joints.



Townsend's Direct Heating Geyser.

The engraving shows a sectional elevation and plan of a water-chamber constructed according to this invention, and a section illustrating the application of the water-chamber to a known type of geyser.

The water-chamber A (of cast iron, brass, or riveted plates) forms a water-tight receptacle B without the aid of solder; the outer wall of the chamber in which the outlet C is provided being shaped to conform to the general contour of the body of the geyser, while the inner wall A^1 is of truncated, conical, or other suitable form, provided with ribs or corrugations on the side next the flames (or on both sides) to increase the heating surface. Cross tubes in the inner wall further increase the heating surface. At the lower end of the chamber a socket D is formed which fits over the stand or burner chamber E of the geyser which surrounds the burner F. The upper part of the geyser, having the usual baffles G over which the water flows to the chamber A, fits into the top of the water-chamber, and has a shoulder which rests on the outer wall of the water-chamber A.

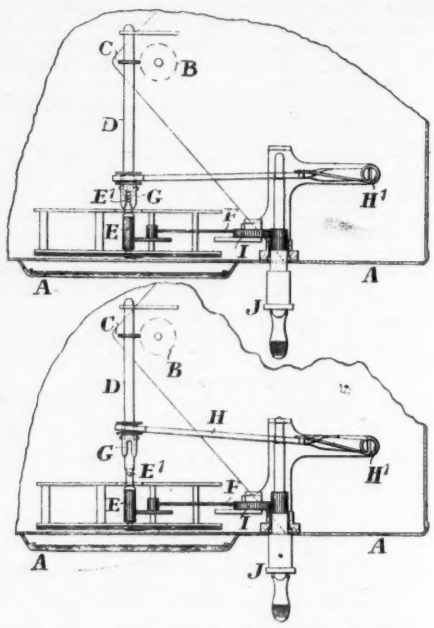
Thus "the water-chamber, which, owing to its proximity to the burner, frequently burns out, can be easily replaced, and can also be made of stronger material."

Gas-Meters.

ALEXANDER, W., and PINCHBECK LIMITED, of Holloway.

No. 8498; April 10, 1913.

This invention has for its object to allow the index of a gas-meter to be set to zero without unsealing the whole of the meter; the train of index wheels being freed from the part driving it by the insertion of a key which, when rotated, acts upon the train to set the index.



Alexander's (Pinchbeck Limited) Gas-Meters.

A section is given of such parts of a gas-meter as are required to understand the invention, with a similar view showing the parts in a different position.

A is the casing of the meter which is kept sealed. Within it is the usual worm B driving a worm wheel C on a shaft D, which is thus driven by the meter. E and F are the first and last members of a train of index wheels also within the casing. The wheel E is mounted on a spindle whose extension is provided with a pin E^1. G is a clutch carried by the shaft D, and adapted to engage with the pin H is a lever, pivoted at H^1, whose free end embraces the clutch G. I is a toothed wheel meshing with the last member F of the train of wheels. J is a key provided with a toothed portion adapted to mesh with the wheel I.

When it is desired to set the index to zero, the key is put through a hole in the casing; its end passing through a hole in the lever H until a shoulder upon it acts upon the lever. When the key is pushed home the lever and its clutch are moved into the second position shown, against the action of a spring. In this position the key can be turned in either direction to set the index, its toothed portion turning the wheel I and therefore the whole train.

On removal of the key, the clutch is brought back into its original position, and the inspector can then place a seal over the hole in the casing through which the key was inserted.

APPLICATIONS FOR LETTERS PATENT.

1997.—DEMPSTER, R., AND SON, LIMITED, and BROCKWAY, F. G., "Vertical retorts." Jan. 26.
2021.—YATES, H. J., "Gas-fires." Jan. 26.
2035.—DAVEY, W., "Incandescent burners." Jan. 26.
2054.—BERLIN-ANHALTISCHE MASCHINENBAU-AKT.-GES., "Manufacture of gas." Jan. 26.
2151.—JULIAN, P., "Gas-lighters and extinguishers." Jan. 27.
2162.—RICHMOND GAS STOVE AND METER COMPANY, LIMITED, ST. LEDGER, A. A. H., and PRATT, J. P., "Flue-pipes." Jan. 27.
2173.—JENNER, H., and E. POLLARD AND CO., LIMITED, "Electric gas-lighter." Jan. 27.
2178.—MOELLER, J., "Treatment of carbonaceous material." Jan. 27.
2255.—BAYNTON, C. S., "Inverted burners." Jan. 28.
2395.—HAGUE, B., "Screw-down cocks." Jan. 29.
2397.—REYNOLDS, A., "Gas-producer." Jan. 29.
2477.—FRANCE, R. A., "Valves for gas-furnaces." Jan. 30.
2511.—DAVEY, H. N., "Gas-turbines." Jan. 30.
2513.—SOC. ANON. D'APPLICATIONS DES GAZ LIQUÉFIÉS, "Pressure-reducing valves for gas." Jan. 30.
2529.—M'KINNIE, E. C., "Illuminating or reflecting devices." Jan. 30.
2554.—GRUBB, D. B., and BUTLER, H. B., "Gas-controllers." Jan. 31.
2609.—HOLLIS, A., "Scrubbers for gas." Jan. 31.

PARLIAMENTARY INTELLIGENCE.

SKEGNESS URBAN DISTRICT COUNCIL BILL.

Non-Compliance with Standing Orders on a Small Point.

This Bill came before Mr. SIMONS JEUNE, one of the Examiners, on Monday of last week, for proofs of compliance with Standing Orders. There was opposition by the Skegness Gaslight and Coke Company, Limited.

Mr. R. J. TAHOURDIN (Messrs. Tahourdin and Birds, Parliamentary Agents), on behalf of the Company, said the Bill had for its object, among other things, the compulsory acquisition of the undertaking of the Skegness Gaslight and Coke Company by the Urban District Council; and in his memorial he claimed that the Company were entitled to have the usual notices to landowners, and also that the usual Standing Orders relating to compulsory purchase of lands should be complied with. This was not merely a Bill for acquiring the works of a company, but for establishing a new gas undertaking altogether, because, inasmuch as the limits of supply of the Company were confined to the parishes of Skegness and Winthorpe, the Council wished to include the parish of Croft. In addition to this, it was proposed to establish further gas-works.

The EXAMINER asked if these were to be erected on the same lands.

Mr. TAHOURDIN replied in the affirmative. Continuing, he said his first allegation was to the effect that, in the notices to landowners and other persons concerned, there were no plans indicating the exact lands to be purchased by the Council; and he contended that the Company were entitled to the benefit of all the Standing Orders for landowners because they were a dissenting Company.

Mr. C. E. BAKER (Messrs. Baker and Co., Parliamentary Agents) said Mr. Tahourdin had not shown that the Council proposed to purchase any of his lands, if he had any. He had given no proofs that any lands of his Company would be taken. The Bill stated that the undertaking included all the works vested in, or belonging to, the Company at the date of the transfer of the undertaking; and therefore the Council would only purchase such property as the Company possessed at the date of the transfer. It would be impossible to describe what lands they might have at that time.

The EXAMINER: It would make it impossible to have any plans at all.

Mr. BAKER said the object of the Standing Orders was to give notice to the owner of the property that he may be dispossessed of his property; and a plan did not follow in the present case. As long ago as Aug. 18 the Company had full notice that the Council intended to purchase the undertaking; and the Bill was then promoted for the compulsory purchase. He drew attention to the fact that in 1909 there were three Bills passed in which these plans were not admitted; in 1910, there were three; in 1911, one; and in 1912, four. He took for example the case of the Maidenhead Corporation Bill, which he had deposited this year, for the compulsory purchase of the Maidenhead Water-Works. There were five pumping-stations situated in different parts of Berks, and reservoirs at all sorts of odd places. He thought it would have been almost impossible to get accurate plans of the properties belonging to that Company. The properties might also have included dwellings in which their workmen lived.

The EXAMINER decided that in this case the notice served was sufficient.

Mr. TAHOURDIN said his next allegation was that clause 16 of the Bill gave power to the Council on the said lands to erect, lay down, provide and maintain, alter, improve, enlarge, extend and renew or discontinue the existing "and other" gas-works, &c.; but the notices did not, as required by Standing Order 3, refer to powers to erect gas-works or works in connection with "other" gas-works. In the Gazette notice there was not a word about "other" gas-works. It was entirely confined to the existing gas-works of the Company; and he submitted that this was a distinct breach of the Standing Order, which prescribed that all the objects of the Bill should be stated in the notice.

The EXAMINER asked whether the Company claimed that the Council would build gas-works on any other land.

Mr. TAHOURDIN said the Bill specifically stated that it would be on those lands.

Mr. BAKER said that the allegation seemed to be that, by the wording of this particular clause, something was proposed to be done of a new character. The Company obtained their powers in 1902, when, by Article 17 of their Order, they were empowered to maintain and continue, alter, enlarge, renew, or discontinue their gas-works and works connected therewith, with all the usual provisions, on the lands specified in the schedule to that Order; and the Council proposed to take over the powers of the Company of manufacturing gas upon those lands, and those lands only. He maintained that the object of the Standing Order was that notice should be given to persons within 300 yards of the site where new works were being constructed; so that they would know that something in the nature of a nuisance was going to be put up, and they might be able to object to the Bill if they thought it desirable. All these notices had been given by the Company in 1902, and, the lands having been used for gas purposes ever since, it was unnecessary to go to the expense and trouble of serving fresh notices on these people. The words "existing or other works" merely meant the alteration of a retort-house, or possibly pulling it down and putting up another one in its place.

Mr. TAHOURDIN said the clause was distinctly divided into two parts; the first part dealing with the existing works and the second with existing "or other" gas-works. He maintained that the second part of the clause gave power to make increasing nuisances on the same spot.

The EXAMINER pointed out that, in the case of the Mitcham Gas-Works, a notice was not required to enlarge the works; and therefore in this case no notice was required.

Mr. TAHOURDIN next said that clause 56 authorized the Council to carry out and maintain any works on the seashore that might be desirable. No such action was stated in the notices as one of the objects of the Bill. Having regard to the great expense to the ratepayers involved, this ought most certainly to have been specified.

The EXAMINER said he thought this was covered by the notice.

Mr. TAHOURDIN then went back to clause 6, with regard to which there was no estimate given of expenditure on the undertaking. The ratepayers should know the expenditure, and Parliament should be able to ascertain as to the resources of the Council for the purpose of meeting the expenditure they proposed to incur.

Mr. BAKER said this allegation was rather humorous. The Company were unwilling to sell, and yet they were most anxious to arrive at the price which the Council would expect to pay for the undertaking. He could not imagine that Parliament would force the Council to state the amount which they intended to give, and so anticipate the Arbitration Act for proceedings which would take place in order to ascertain the price to be paid.

Mr. TAHOURDIN said it was not the Company who required this; it was to determine the periods of time to be granted for loans.

The EXAMINER overruled the allegation.

Mr. TAHOURDIN said the next allegation was on clause 64, which dealt with the definition of future lines of streets and street widenings generally. It was a compulsory purchase of lands under disadvantageous terms to the landowner, because it provided that the difference should be settled under the Arbitration Act, 1889. There was nothing in the notice with regard to this.

Mr. BAKER said it was a very common clause, and was inserted in Local Legislation Bills with the object of enabling the local authority to widen its streets.

The EXAMINER said the question was whether it was in the notice.

Mr. BAKER said that, looking at the form of the clause, it would be seen that the authority had first of all to make a plan of a particular street and show the line which was proposed to be the future building line of the street. The clause provided that the line to be prescribed should be distinctly marked to enable the local authority to widen its streets. It made this prescribed line upon a plan deposited in the town hall, where it was open to inspection.

The EXAMINER asked whether the Council had power to take lands compulsorily under the Arbitration Act.

Mr. BAKER did not know that they had. This matter applied to the Public Health Act; and there had been instances where a landowner, having been required to set back his buildings, had refused to give up possession of the bit of land. It was really the vesting of the land in the street. He could not build upon it because he had to set his house back. It was not a compulsory purchase. The Council could not turn it into a recreation ground, or anything like that. The Bill prescribed that notice should be given to any person affected by the operation of the clause; and that was sufficient direction to him.

The EXAMINER did not think sufficient notice had been given.

Mr. TAHOURDIN then raised an objection as to the estimate of expenditure with regard to the works to be carried out on the seashore.

The EXAMINER did not think there was really anything to be said on this matter.

An allegation was then made that the contents of a large number of clauses were not included in the notices.

Mr. BAKER said that this allegation was made on the ground that the Bill conferred certain privileges; but this did not mean that every clause containing privileges must be set out in the notices.

These clauses, however, were not further discussed.

Mr. BAKER suggested that the Examiner might exercise his discretion as to reporting the Bill for non-compliance.

LEGAL INTELLIGENCE.

WATER SUPPLY FOR WORKHOUSES.

Appeal Dismissed.

In the House of Lords last Friday, Lords LOREBURN, ATKINSON, PARKER, and SUMNER delivered judgment in the appeal by the Bristol Guardians from an order of the Court of Appeal affirming a judgment given by Mr. Justice Eve, in an action brought by the Guardians against the Bristol Water-Works Company with respect to the supply of water to the workhouse. They claimed that they were entitled to a supply at the domestic rate; and the Courts below held that they were not so entitled. The proceedings in the Chancery Division were reported in the "JOURNAL" for Nov. 7, 1911, and those in the Court of Appeal in the numbers for March 12 and April 16, 1912. The arguments before the House of Lords were noticed in the "JOURNAL" for Dec. 9 last (p. 823).

Lord LOREBURN delivered the unanimous judgment of their Lordships that the order appealed from should be confirmed. He said the Bristol Water-Works Act of 1862 stated that the occupier of a private dwelling-house was entitled to a supply of water for the domestic use of every such occupier, at certain rates therein specified. A workhouse was not a private dwelling-house; and he agreed with the Court of Appeal that there was no section in the Special Acts which imposed on the Company the duty of supplying dwelling-houses which were not "private" with water for domestic purposes. It was quite true that in construing Private Acts the rule was to interpret them strictly against the promoters, and liberally in favour of the public; but a Court was not at liberty to make laws, however strongly it might feel that Parliament had overlooked some necessary provision, or even had been overreached by the promoters of a Private Bill. To his mind it was a very serious matter that the Company, who had practically a monopoly, should be free to charge what they pleased, or to refuse a supply for necessary domestic consumption except to a private dwelling-house; and he had been anxious to escape from this conclusion if it could be done without departing from the line of judicial duty. The only

plausible means of escape from what, in view of all legislation, was obviously a draftsman's blunder many years ago, was to say that it was a duty of the Company to supply all dwelling-houses; and, as the Special Acts were silent as to rate, the Court ought to say that it was to be a payment or tender of a reasonable sum. It was one thing to introduce terms into an Act of Parliament in order to give effect to its clear intention by remedying mere defects of language; it was quite another thing to imply a provision which was not in the Statute in order to remedy an omission, without any ground for thinking that one was carrying out what Parliament intended. It was not their intention to repair the blunders that were to be found in legislation. It was for Parliament to say whether it would in its wisdom interfere.

The appeal was accordingly dismissed.

JEWELLERS RECOVER FOR IMPURE GAS SUPPLY.

At the last sittings of the Athy Quarter Sessions, two firms of local jewellers (Messrs. Duthie and Higginson) sued the Athy Gas Company to recover £20 and £21 respectively, as damages for injury to their stock of silver and electro-plated goods, owing to the gas being, as was alleged, impure and of inferior quality.

Evidence was given as to the bad smell from the gas in November last, and of complaints being made to the Company. Some electro-plated goods were produced in Court, which it was said would require replating.

Plaintiffs' evidence was to the effect that they only claimed one-third of the value of the goods injured. It seemed as if the damage was done by sulphur given off by the impure gas. Mr. Higginson stated the manager of the gas-works asked him what could he do with bad coal?

A jeweller from Dublin said the injury could be done by air. The articles produced were tarnished, but could be cleaned. He thought £5 would remove any damage done.

His Honour Judge Brereton Barry, K.C., held that the admission about the use of bad coal showed negligence in the manufacture of the gas; and he gave a decree for £10 in each case, with expenses.

A GAS-WORKER'S CLAIM.

At the Woolwich County Court last Wednesday an application for compensation was made by Henry George Collard, a boilermaker, of East Ham, against the Gaslight and Coke Company. Mr. Hughes, who appeared for applicant, explained that the accident happened on July 2, 1906. The man had previously met with an accident in 1900; and when he returned to work it was understood that he was not to be sent aloft. After a change in the foremen, applicant was sent aloft; and a few days later he met with a second accident—falling from a scaffold and sustaining severe injuries. Compensation at 19s. 1d. a week was paid until April 11, 1913, when it ceased; respondents being of opinion that he was fit for work, and that he had refused to do the work offered. Eventually applicant tried to do some work in August and September, but had to give up; and Counsel urged that he was still incapacitated and entitled to compensation.

For the applicant, two doctors stated that Collard was still suffering from the effects of the accident, and was unfit for work.

For the respondents, several medical men expressed the opinion that Collard was originally sound and able-bodied, except for a flat foot, and was quite fit to do light work as a prelude to resuming his old employment. One doctor, Sir George Hastings, said that work was the only cure for applicant's condition; and another said that he had become obsessed by the state of his health and was nervous.

Mr. Doughty, for the respondents, said there never was a case in which a man had been treated with so much kindness and consideration—in fact, too long for the applicant's interest.

His Honour pointed out that, notwithstanding the reports of the doctors, the Company had continued payment of compensation until April last.

Mr. Doughty hoped the respondents would not be prejudiced because of that.

His Honour said that the medical evidence was as diverse as the poles; and he reserved his decision.

Centenary of Gas Supply in South London.

Among the editorial notes in the current number of the South Metropolitan Gas Company's "Co-Partnership Journal" are the following on the gas supply of South London: "This month completes eighty years of the Company's existence as an organized body. In the preamble of the first of our Special Acts of Parliament ('South Metropolitan Gas Light and Coke Company's Act, 1842') it is stated that on Feb. 20, 1834, certain persons formed themselves into an association or company for supplying gas in certain districts of South London. At the date mentioned, the Old Kent Road works were actually manufacturing gas. Probably the venture had, up to that time, been to a great extent a private speculation. Sir George Livesey once stated that the project for the erection of works in Old Kent Road dated back to 1829, and that may be accepted as fact; but Feb. 20, 1834, must be regarded as the date of the constitution of the Company. In one sense, and a very real sense, our business is as old as the most ancient portion of South London. The first public gas-works to be constructed were the original Bankside works; and there is good reason to believe that these were erected by Monroe and Co. some time during the year 1814. As the business then founded was taken over by the South London Gas Company in 1821, which was reconstructed as the Phœnix in 1825, and amalgamated with the South Metropolitan in 1880, there is good reason why the year 1914 should be regarded as the centenary of South London's gas supply."

MISCELLANEOUS NEWS.

THE GAS LIGHT AND COKE COMPANY.

The Two Hundred and Fourth Half-Yearly Ordinary General Meeting of the Proprietors of the Company was held at the Chief Office of the Company, Horseferry Road, Westminster, on Friday last—Sir Corbet Woodall, D.Sc., M.Inst. C.E. (the Governor) in the chair.

The Secretary (Mr. Henry Rayner) read the notice convening the meeting; and the seal of the Company was affixed to the Register of Proprietors.

The Governor's Speech.

The Governor, who was received with loud applause, said: Ladies and Gentlemen, following our usual custom, the report and accounts having been printed and circulated, I propose, unless exception is taken, to take them as having been read. [Hear, hear.]

EFFECT OF THE COST OF COAL.

When, in February, 1906—eight years ago—I occupied this chair for the first time, it fell to my lot to explain how it happened that for the third consecutive half year the Directors were advising the declaration of dividends larger than the profits earned in the period justified. I will not go over the explanation now, but will simply recall that, at the following meeting, I remarked how much more congenial was the task of explaining a surplus than of excusing a deficit. To-day, as in 1906, we are again, for the third time in succession, carrying forward a balance smaller than that with which we opened the half year. This will be no surprise to the shareholders. For two years past the cost of coal has been much above normal—the purchases last year very exceptionally so. In August last, I reported that for the supplies purchased forward to June, 1914, we should have to pay more by £175,000 than the already high charges for 1912-13. In this lies the explanation of the reduced balance. The accounts before you show that there has been no departure from the policy which has been attended with a measure of success during the past years. Every department has been well maintained.

CAPITAL OUTLAY.

Of the £87,534 expended on capital account, only £4370 is due to works and plant; the remainder, £83,164, being needed for meters, stoves, mains, and service pipes, for distribution—not manufacture. Against this, there has been written off for depreciation of stoves, &c., £60,008; of plant, £1462; and there is also a credit for land sold of £5618—in all, £67,088. The net addition to capital is thus reduced to £20,446. If credit be taken for £15,000, the half-yearly contribution to the capital redemption fund, there remains only £5000 to be added to expended capital out of the large figure of £87,500 with which we started.

THE ACCOUNTS.

The accounts show that the profit of the half year has been adversely affected by several causes. In addition to dearer coal and oil, we have had a mild autumn, with a consequent falling off in the demand for gas and coke. The output of gas shows a decrease of 1·78 per cent. compared with the quantity sold during the corresponding period of 1912. This decrease may be taken as wholly due to the extraordinarily mild weather of the six months. In nineteen consecutive weeks the average temperature was higher than in the preceding year. It was not until the closing days of December that we had any experience of winter; and then we had very satisfactory increases. It must, however, be remembered that in the corresponding half year we had an increase of 7¼ per cent.—being the largest increase in business which the Company had had for 17 years. The decrease in rental was £35.461. Of this, £30,000 is due to reduced sale, and £5500 to slight reductions of price. The increase in rentals for meters, stoves, and fittings is very satisfactory evidence of the continued growth of the Company's business.

RETURNS FROM RESIDUALS.

There has been a falling off in the revenue for coke, due wholly to the smaller quantity of coal carbonized. Tar has done well; but the receipts for ammonia are less—due, as to half, to the reduced market price of sulphate, and the remainder to the smaller quantity made. The total receipts for residuals would have been £20,000 less had it not been for improvements in manufacture.

CARBONIZATION—MAINTAINING THE PLANT.

On the other side of the revenue account the most interesting item is, of course, coal. The increase in price represents £88,072. The smaller quantity carbonized reduces this figure by £38,674—leaving an excess over December, 1912, of £49,400. The carbonizing has been further improved, saving 20,834 tons of coal; otherwise, the extra on coal would have been £66,200. Oil has cost more by nearly £9000. Of this, £5275 was due to an increase of 10 per cent. in the volume of oil gas made; the balance to higher price. The results obtained from the new plant at Beckton have been good. Wages are less by £15.500. This follows the reduced quantity of gas made, and is helped by additions to the mechanical appliances on the works and the better production per ton. The charge for repairs and renewals of plant on works is the heaviest I can remember. It amounts to nearly £260,000, and includes some items outside the ordinary which might have been met out of the Special Purposes Fund had we so desired. Retort renewals have been especially heavy; and a considerable sum has been spent upon rearrangements of the steam-producing plant at several of the stations. In the current half year, charges under this head will be lighter; but there will be no slackening of effort to maintain the works at their highest level of efficiency.

DISTRIBUTION.

There has been a satisfactory reduction in the cost of distribution, which will, we hope, prove permanent.

OTHER ITEMS IN THE ACCOUNTS.

One other item calls for notice—the apparent saving on rates and taxes,

due in part to a rearrangement of the basis of assessment of taxes and also to reduced profits. Rates march only in the opposite direction. Two items in account No. 5 (net revenue) call for notice. Our revenue from investments and cash on deposit was less than the charges against us for interest on various funds; while last year the balance was £1322 to credit. This year we carried larger and much more costly stocks, especially of coal, and, consequently, there has been less money to deposit with the bankers, and less interest to receive. It is, however, gratifying to know that the depreciation in the value of investments, referred to at our last meeting, has been nearly overtaken. The loss on investments, which on Dec. 31 stood at £42,950, stands to-day at £9808 only. The other item is the Special Purposes Fund Seeing that we are drawing upon the undivided balance to pay dividends, the Directors decided to postpone additions to the fund till the balance was again increasing. The financial result of the half year is given in the report. We propose that the dividend be at the rate of £4 17s. 4d. per cent. per annum, which will leave £614,053 to be carried forward—being £96,500 less than in June last.

PROSPECTS OF THE FUTURE.

And now as to the future. That we should have to make a heavy call on our reserves at this time has not come to us as a surprise—indeed, the amount of the call is less than was estimated. In the current half year the charge for coal per ton will show a further rise, because all that is used will have been purchased at the highest price, not helped by stocks purchased at a less cost. Again, the market price of coke is low for the present; and, as I said six months ago: "According to present indications, there is not likely to be any considerably increased credit on account of residuals." The economies in working which we shall be able to effect may be considerable; but they will not go far as an offset to these heavy burdens. Therefore we can hardly hope to make a less heavy call upon our surplus funds at the end of the current half year than we are doing to-day—it will probably be greater. On the other hand, we know that the price of coal cannot long be kept at its present injurious level. There are evidences to-day that the summit is passed and the down-grade entered upon. To what extent this may bring relief, I cannot say; but the fact is encouraging. We have also to bear in mind that the balance to the credit of net revenue, specially accumulated to meet circumstances such as those we are dealing with, is still a large one, and will bear further drawing upon.

PRICE OF GAS.

You know how earnestly the Directors will strive to avoid any increase in the price of gas; and we hope it will not be necessary. Upon this a clearer judgment can be formed when the forward coal contracts are made. I can, however, definitely say that, for the current half year, the price of gas will remain as at present, as also the dividend.

THE GAS CONGRESS AND EXHIBITION.

I cannot close my remarks without referring to the National Gas Congress and Exhibition at Shepherd's Bush, which was duly held during the month of October, to celebrate both the centenary of statutory gas supply and the jubilee of the Institution of Gas Engineers. The very widespread interest taken in the Congress and Exhibition was evidenced by the long list of influential persons who became its patrons—headed, as we shall always gratefully remember, by their Majesties the King and Queen—and by the number of leading civic and other dignitaries who supported the Lord Mayor of London when he performed the opening ceremony. Over 200,000 members of the public visited the exhibition, coming from all parts of the kingdom; and the Press, not of London only but of the country generally, gave to it and to the various proceedings at the Congress wide and appreciative notice. The enterprise was truly national, alike in its conception, its organization, its supporters, and its benefits. An excellent spirit of co-operation, both between the various gas undertakings and between the competing manufacturers of gas appliances, animated the proceedings, and augurs well for the future of the industry. This Company contributed substantially to the cost of the exhibition; it also gave the services of its officers in so far as they were able to assist in the very considerable work of organization and execution. One of the officers, Mr. F. W. Goodenough, was elected Chairman of the Executive Committee, and, devoting himself in a remarkable manner to the enterprise, contributed largely to its success and won the respect and admiration of all associated with him.

MR. FIELD'S DEATH.

I regret having to report the death of Mr. J. W. Field, who was for so long a time the chief officer and afterwards a Director of the Company. He was in his 74th year, and had been withdrawn from active affairs for some years. By all who knew him he was held in respect and high esteem.

RESIGNATION OF MR. REESON—HIS SUCCESSOR.

Mr. J. N. Reeson, who had been in the service for 27 years—eight years as Resident Engineer at Beckton—has retired and accepted an appointment as Chief Engineer to the Melbourne Gas Company. Mr. Reeson takes with him the good wishes of the Directors, and all who served with and under him. His place at Beckton has been filled by Mr. T. S. Lacey, latterly Engineer at Nine Elms. I now have pleasure in moving:

> "That this meeting do agree with, and confirm, the report of the Directors and the Auditors' report and statement of the accounts of the Company as transmitted to the proprietors on the 26th ult."

The DEPUTY-GOVERNOR (Mr. John Miles): I beg to second that.

The GOVERNOR: Before putting the resolution to the meeting, I shall be happy to hear any remarks which proprietors may wish to make, and endeavour to answer any questions that may be asked.

There being no questions asked, the resolution was put and carried unanimously.

THE DIVIDEND.

The SECRETARY next read from the Directors' minutes the following:

> Resolved that it be recommended to the half-yearly ordinary general meeting of proprietors to be held on the 6th prox.:—
>
> (1) That the sum of £15,000 be set aside out of the divisible profits of the Company for the half year ending on the 31st day of December last towards the redemption fund, in accordance with the provisions of the Company's Act of 1903.
>
> (2) That a dividend as follows for such half year be declared:
>
> On the 4 per cent. consolidated preference stock at the rate of £4 per cent. per annum;
>
> On the 3½ per cent. maximum stock at the rate of £3 10s. per cent. per annum;
>
> On the ordinary stock at the rate of £4 17s. 4d. per cent. per annum;
>
> subject to deduction of income-tax.

The GOVERNOR: I beg to propose the adoption of these recommendations.

The DEPUTY-GOVERNOR seconded; and they were carried unanimously.

RE-ELECTION OF DIRECTORS AND AUDITORS.

The GOVERNOR then moved, and Mr. JAMES DOUGLAS WALKER, K.C., seconded, the re-election of the retiring Directors, Mr. John Miles, Mr. Joseph Lister Godlee, and Sir Hugh Owen, G.C.B.; and they were re-elected unanimously.

It was then moved by Mr. G. E. P. HODGE and seconded by Mr. J. HATCHWELL—"That Mr. John Allen Stoneham and Mr. Percy Howard Ashworth be re-appointed Auditors;" and they were re-appointed unanimously.

The GOVERNOR: That concludes the business of the ordinary meeting.

EXTRAORDINARY MEETING.

THE COMPANY'S BILL.

The SECRETARY having read the notice convening the Extraordinary Meeting and the heads of the Bill promoted by the Company,

The GOVERNOR said: The proposal to promote this Bill has been before the proprietors on a previous occasion; and I have no intention of making any speech now in explanation of it. We are, as you know, at the present time under two standards of quality—one, illuminating power, and the other calorific power; and for deficiencies under either we are subject to penalties. What we propose asking is that the illuminating power test shall be abolished altogether, and that we shall be judged only by the heating value of the gas. It is hardly necessary for me to again explain that the proportion of gas now used, at any rate in our district, for purposes other than heating, where the illuminating value is of any value at all, *quâ* illuminating power, is very small indeed. I think I am right in saying that fully 96 per cent. of the gas sent out is for the purpose of heating; and its heating value is alone of consequence. In speaking of heating value, I speak not only of gas used for industrial purposes, fires, and cooking, but also for a very vast proportion of the gas employed for lighting. With incandescent burners, as you know, the illuminating power counts for nothing—the heating value alone is of importance. We have been working under this dual test for some time; and since 1909 we have been under penalties for deficiencies in either direction. The proposed alteration will save us from a great deal of vexatious and costly experience, and the consumers will not suffer thereby. There is no intention of reducing the value of the gas from the illuminating point of view. I may mention that when the coal strike was on we made an application to the London County Council to relieve us for a time from penalty testing for illuminating power; and they very properly, and I think very nicely, agreed to the application. For some months we were at liberty to manufacture gas without regard to its illuminating power; but during that time there was no substantial falling away in the illuminating value supplied. Therefore I say there will be no loss to the consumers, but a gain to them, because the constant watching of the illuminating power, and the necessity for keeping always at every one of our fourteen testing-stations such a margin as will satisfy the tester, lead to unnecessary cost. The change in the standard is a very small one, and is only intended to bring our standard into uniformity with those of other gas companies in the kingdom—a change from calories to British thermal units—the difference is under 2 per cent. compared with the standard to which we now work. I beg to move:

> That the Bill now submitted be and the same is hereby approved, subject to such alterations as may be made in the Bill by Parliament and approved of by the Directors.

The DEPUTY GOVERNOR seconded.

There being no questions asked, the resolution was put to the meeting and carried unanimously.

VOTES OF THANKS.

Mr. F. G. PILLEY said he made no apology for detaining the meeting to say a few words upon a subject which applied to all there. He had no doubt the Governor would desire to make some appreciative remarks with regard to the management and the staff—a subject upon which he was so well qualified to speak, and it was a subject with which every shareholder would desire to associate himself. But he thought there was a duty which must fall upon someone in the body of the hall; and it was a duty which became a greater pleasure every succeeding half year. [Hear, hear.] This duty and pleasure was to express their appreciation and sense of indebtedness to the Board generally and Sir Corbet Woodall in particular for the very valuable services rendered since they last met.

Mr. J. REESON, in seconding, said it was always a great pleasure to them to express their admiration of the Governor and their appreciation of the noble work he had done for the Company.

The resolution was carried unanimously.

THE GOVERNOR'S REPLY.

The GOVERNOR: I thank you very much, on behalf of my colleagues and myself, for the resolution you have been so good as to pass. I may just say that I have felt during the morning—possibly owing to the burden of a very bad cold under which I am labouring—that my observations had partaken of a somewhat melancholy tone; but I beg you to believe that there is no melancholy in my anticipation of the future of this great Company. We are undoubtedly going through a time of strain and stress; but, thanks to the arrangements made in the past, we have not the slightest anxiety with regard to the future. [Applause.] I believe that in a very short time we shall be in smooth

water, and no longer calling on the work of the past to help us in our present labours. Before sitting down, may I say how cordially we recognize the help given us by the staff and workmen generally throughout the half year. I do not think that at any time have we stood in better relations with the large staff, workmen and employees, than we do to-day; and it is the earnest effort of all the Directors and the chief officers to maintain this most comfortable and profitable state of affairs. To the chief officers and the engineers I can say that we appreciate very highly the way in which from half year to half year they improve upon the results; and I am quite sure that we have not reached the end of the possibilities in the manufacture of gas. I beg to move that our best thanks be given them.

The motion was seconded by Mr. W. BROWN, and carried unanimously.

REPLIES ON BEHALF OF THE STAFF.

The GENERAL MANAGER (Mr. D. Milne Watson), on behalf of the officers and the workmen, thanked the meeting most cordially for the kind words of appreciation of the work done during the past half year. He was always glad to feel that the Directors had confidence in the staff; and he assured them and the proprietors that no effort on the part of the employees would be spared in order to increase the prosperity of the Company.

Mr. THOS. GOULDEN (the Chief Engineer) said that, associated as he was with the engineering staff, he would like to couple himself in the expressions of pleasure with which Mr. Watson had told them that all the officers and workmen of the Company would receive this vote. They had done their best in the engineering staff, as every other officer in the Company had done, to minimize somewhat adverse circumstances; and, as they had heard from the Governor, they had done a great deal. They would certainly not relax their efforts; and there was a strong conviction in the minds of both the staff and the men that by further improvements in the working they would contribute very materially to keeping the Company in the same position it had enjoyed for so many years past.

COMMERCIAL GAS COMPANY.

The Ordinary Half-Yearly Meeting of the Company was held last Thursday, at the Cannon Street Hotel, E.C.—Mr. W. G. BRADSHAW in the chair.

The SECRETARY (Mr. F. J. Bradfield) read the notice convening the meeting, and the Directors' report and the statement of accounts—dealt with in the "JOURNAL" last week—were taken as read.

THE DIVIDEND EARNED.

The CHAIRMAN: Gentlemen, I have now to move—"That the report and accounts be received, adopted, and entered on the minutes." The first thing I want to call your attention to is the fact that these accounts are submitted to you a fortnight earlier than usual. We are also holding this meeting a fortnight earlier than is customary, which means that we shall pay the dividend a fortnight before the usual time. This will meet with the approval of all the proprietors. For this improvement, I should like to say, we are indebted to the ability and the energy of our Secretary and Accountant (Mr. Bradfield) The accounts reveal better results than we could possibly have anticipated, and this in spite of the fact that the warm weather in the autumn retarded the ordinary increase in the business. In August last, when I had the pleasure of meeting you, I quite intentionally led you to expect that we should not, in the then current half year, earn our dividend; and although that gloomy prophecy has not been fulfilled in our case, it has been the fate of every other gas company in London, and, so far as I know, in the neighbourhood of London. They have all failed to earn their dividend. We have just earned ours, and have a small surplus; but, in common with the others, our report shows a large decrease in profits.

BOOMING TRADE AND A SLACKENING OFF.

The year 1913 was, as you know, a year of continued prosperity. The boom in trade which set in in 1910 was carried on until nearly the end of the past year, and was accompanied, as always, by high prices for money, and depreciation in the value of securities. The foreign trade of the country again passed all previous records, amounting to no less than 1404 millions—an increase of 60 millions over 1912, and of no less than 167 millions over 1911. If you go back eight years, the increase in the foreign trade of the country is no less than 431 millions, which is 44½ per cent. I think that is a very good answer to those pessimists who declare the country is fast going to the dogs I for one do not believe it. The end of the year showed a falling off in trade; and, as you know, there has been a distinct reaction, followed by cheap money and appreciation of securities. I think myself the decline of trade is only temporary, and that the demands of new countries which are developing their resources will probably, in the not distant future, bring about increased activity.

HIGHER PRICES FOR COAL AND OIL, LOWER ONES FOR RESIDUALS.

The outstanding features of 1913, so far as gas companies are concerned, are the abnormally high prices of coal and oil. It is true the Company only felt the increase to a small extent in the first half of the year. This is due to the fact that we make our contracts for coal from the 1st of April; and we had large arrears to come in under the old contracts at lower prices. Now the accounts show, in the diminished profits, how heavily the increased price of coal has fallen upon us. We are paying now for coal no less than 2s. 1½d. per ton more than this time last year, and no less than 4s. 9d. per ton more than two years ago. Last year was one of abnormal prosperity to the coalowners and the miners. As you know, we derive all our coals from the Durham coalfields; and the wages of the miners in Durham were increased last year by 13⅝ per cent., which brought them up to the level of 60 per cent. more than the standard of the year 1879. That is not quite the highest since 1879; but if you take into consideration the shortened hours and the improved conditions under which the miners work, they are receiving by far the best remuneration they have ever had in the history of the coal trade. The result was not a pleasant one. Instead of being thankful, and putting renewed energy into their work, the miners relaxed their efforts. It is calculated that, owing to their refusal to work their full time, no less than 20 per cent. of loss was occasioned in the coalfields. The result of this is, of course, that prices have been kept up artificially; and we and other industries have suffered from it. It is estimated that the output of the collieries of Great Britain last year amounted to 280 million tons, of which about one-third, or 98 millions, were exported—again, to the detriment of home industries. The amount exported shows an increase of 20 million tons over the quantity exported in the previous year. With this rise in the prices of coal and oil, we had to face a fall in the price of coke of no less than 3s. 4d. per ton; and with that, we had diminished returns from sulphate and tar. When you put these three things together, you have the principal causes why we have lower profits to report to you to-day. Under all the circumstances, I feel that you are to be congratulated in not having to draw upon our reserves, or even to reduce the dividend we recommend you to pay.

HARD TIMES NOT AN UNMIXED EVIL.

Well, gentlemen, hard times are not altogether an unmixed evil. When profits are very easy to earn, and everything is prosperous, the Directors and Managers and everybody else are rather inclined to "let well alone," and then there is no improvement and very little progress. As you are aware, an Arab proverb says: "All sunshine makes the desert." When profits are difficult to earn, then we begin casting about to see how we can improve methods of manufacture, and how we can effect economies in one place and another. "Necessity" again becomes "the mother of invention." I think I can report to you several improvements that we have succeeded in making during the last few months. As you know, the Company have three works. We have the original works at Stepney, which are situated on the Regent Canal. There are the works at Wapping which we took over from the Ratcliff Gas Company in 1875, which are situated on the River Thames, and which have the great advantage that we can get ships alongside the wharf, and transfer coal straight into the works. Then we have the works, built in 1878, on the River Lea, at Poplar. Up to twelve years ago, all the coal that we used at Stepney and Poplar had to be taken there in barges. But, if you remember, about twelve years since, owing to the energy of our friend the present Engineer (Mr. Stanley Jones), we succeeded in taking a little ship up to Poplar. We were so successful that we finally built our own ships, so that up to the present we have been able to convey our coal in small ships right up to the Poplar works. But we have still been taking coal in barges to Stepney, with the result that the Stepney works are much more expensive than the other works. Then came the strike—hard lines again, and we found that we could not get the coal put into barges. All that could be done, therefore, was to hire carts, and to cart the coal. The result was that we found it much cheaper to cart the coal than to send it up in barges. Now we have invested in some waggons, and are taking the coal straight out of the ships at Wapping, and sending it up to Stepney by road. It is found that we can now make gas at Stepney as cheaply as, and even more cheaply than, at Poplar. This is an improvement, and a result of what at the time we considered very hard. By the improvements I have detailed to you, we have succeeded in saving 2s. 2d. per ton of coal; and we can utilize our fine works at Stepney, thanks in great measure to the foresight of Mr. Henry Jones, who provided us with a magnificent wharf at Wapping. Then, again, we have greatly improved the manufacture of gas. From the year 1881 down to 1901, we only realized an average of 10,000 cubic feet of gas per ton of coal. This last half year, the average make has been 13,726 cubic feet, which is an improvement of no less than 37 per cent. Of course, I should point out that we are making a 14-candle gas now, whereas formerly we had to make 16-candle gas [Mr. HENRY E. JONES: 18-candle] It was nominally 16-candle. But, of course, the tests were much more severe then than they are to-day. Again, the mild weather of the autumn and other causes—such as the falling off in trade—affected not only the price of coke, but the sales of coke. This led to experiments with the steamers; and we found that coke could raise steam in our steam ships cheaper than could bunker coal. That was a further economy forced upon us by the hard times. Then the coal porters' strike in London has been the means of opening people's eyes to the advantage of burning coke. My attention was called some time ago to an article in the Fuel Supplement of "The Times," published on Dec. 1 last. In it there is a discussion upon the burning of fuel in open grates; and some remarkable differences are shown between the advantages of using coke instead of coal. If you burn ordinary household coal in open grates, you lose no less than 81 per cent. of its heat value in the gases which pass up the chimney, and only 19 per cent. of the heat value is utilized in warming the room. On the other hand, if you use coke in the same stove, you lose only 56 per cent. of the heat value of the fuel, and 44 per cent. of the heat value is utilized in warming the room. Coke gives a good bright fire. Coke combined with coal gives a far better warmth, and just as cheerful a fire, as coal alone, and is much more economical. I think, perhaps, that the coal porters' strike (which caused so much unpleasantness in London) will be the cause of a great many people in future buying, at any rate, half their solid fuel in the shape of coke for use in warming their rooms. I may say that I tried it myself, with very excellent results. Of course the strike of coal porters had one other beneficial effect for gas companies; it stimulated very much the demand for gas-fires. Sir Edwin Cornwall, when he broke away from the Coal Merchants' Federation, and conceded the terms of the men, gave, as one of his principal reasons for doing so, the fact that, if the strike continued any longer, people would take to the use of gas-fires instead of coal. If they do, it will be not only to the advantage of the gas companies, but to their own advantage, as it will purify the air of London very much indeed.

GAS CONSUMPTION AND NEW CONNECTIONS.

Coming to the consumption of gas, we have only a small increase—in fact, it only amounts to $\frac{1}{10}$ per cent. In other words, we only sold in the last six months 1¾ million cubic feet of gas more than in the corresponding half of the preceding year. I think that this was entirely due to the warm weather experienced during the autumn months, when, of course, the principal consumption of the half year takes place. The Gaslight and Coke Company had a decrease of 1¾ per

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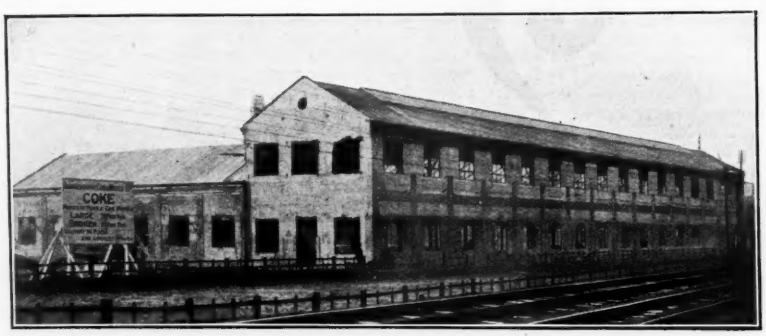

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cent., and the South Metropolitan Company had a small increase—1½ per cent. If you take a larger view of the situation, and look back ten years, our sales of gas have gone up by 20 per cent, ; the sales being now better per half year than ten years ago by 286 million cubic feet. And this in spite of the fact that our district cannot expand. We never have a new house built except in the place of one that is pulled down, as we have no open spaces that can be built upon, and the district is circumscribed. Still I am sure of this, that there are still considerable possibilities of development, and that our Company will still continue to grow. As proof, we fixed last year 3256 more stoves; and in the half year, 1634. Some 66 per cent. of our consumers now have stoves. Of coin meters, we connected in the year 2152 more ; and in the half year, 1080. We have now a total of 111,947 consumers, of whom some 24,638 take their gas through ordinary meters and 87,309 through coin meters.

VARIATIONS IN THE ACCOUNTS.

Now, if you will turn to the accounts, I will briefly go through the salient features. I have nothing to say upon the capital account. You will see the expenditure is negligible; and in the result there is a credit, because the depreciation fund for prepayment meters and fittings exceeded the amount of the capital expenditure. The capital per million cubic feet is now £425; last year it was £428. This figure goes down very satisfactorily every half year. Now, looking at the revenue account, you will see that the balance carried to net revenue account is £64,649, which has to be compared with a profit this time last year of £78,617. That is to say, it is £13,968 less. I will explain to you how it is we have the lower profit. Coal and oil cost more by £15,848. On the other hand, residuals—coke, tar, and ammonia—produced less by £2138. Coke yielded less by (using round figures) £500, tar by £1000, and sulphate of ammonia by £500—all due to the prices having fallen. Putting together the increased cost of coal and oil and the reduced receipts from residuals, we have a sum of £17,986. On the other hand, we have had no large repairs to do, and have saved £4932, and this although the works are kept up in the best possible way. Distribution cost £2814 more. Gas produced only £89 more ; rental of meters, stoves, and prepayment meters gave us £1724 more. All these figures combine to make the difference of £13,968 in the balance of profit. While the net profit of £64,649 is sufficient to pay the interest on the debenture stock and the full statutory dividend, it also leaves a surplus of £652 to be added to the sum carried, raising it to £93,518. When we meet you in August, we shall have to draw on this sum of £93,518 in order to pay the dividend.

RELATIONS WITH EMPLOYEES.

I have a few more words I should like to say on a topic to which I have referred on many previous occasions. Our relationships with the employees, and between managers and workmen, continue to be of the very best. We constantly meet our workmen at various committees ; and we are very glad indeed to do so. We have very happy meetings ; for there is a great deal of cordiality existing between the Directors and the employees. We never make any difference whether a man belongs to a union or whether he does not. In fact, Mr. Bradfield agrees with me that we get some of the best help from the men who are the local officers of the trade union. They work as cordially with us as do the other employees. I believe the men really recognize that we and you desire to help them to improve their position, and benefit them in every possible way. Quite recently we have been making some improvement in the condition and hours of labour ; and the improvement has met with the hearty appreciation of all concerned. Of course we do our very best for the men. Last year we spent no less than £10,000 in various ways upon them—among other things on profit-sharing, and the health and benefit societies—of which sum only a small proportion was compulsory under the National Health Insurance Act. This does not take into account the amount of money we spend on managing the various societies, and the large amount of time the officers give in helping the men in these directions. The men are indeed very much indebted to Mr. Bradfield and Mr. Maddocks, who give a large amount of thought, labour, and energy in assisting them. When I have said all this, I believe that the proprietors have an ample return in the increased good will and good work which the men give.

THE IDEAL HOME GAS DISPLAY.

Before I sit down, I should like to acknowledge the debt of gratitude which all gas companies in England owe to Mr. Charles Carpenter, D.Sc., the Chairman of the South Metropolitan Gas Company, and those who work with him, for the admirable display of gas lighting and other applications of gas and coke that he made at the Ideal Home Exhibition. It was held towards the end of the summer last year. Nothing had been done by others ; and the South Metropolitan Company stepped into the breach, and carried out an exhibition of gas which was a brilliant success.

THE ANGLO-AMERICAN EXHIBITION.

I suppose you know, too, that it is proposed to hold this year an Anglo-American exhibition. A suggestion came from the South Metropolitan Gas Company that gas should be represented there. I am, however, sorry to say the proposition has not met with the support it deserves. I think it will be a great pity if gas companies are not represented at an exhibition where hundreds of thousands of people will go. I should like to assure Mr. Carpenter that the Directors of the Commercial Gas Company are prepared to back him up in this matter in every way in their power.

THE OUTLOOK.

In conclusion, let me say once again, I fear we shall not—in fact, I am quite sure, we shall not—earn our full dividend this half year. But there are signs that the price of coal is falling very considerably ; and there is no doubt the restriction in trade must lead to a decline in the price of coal, if it is not artificially and unjustifiably kept up. Oil is already cheaper ; and it will likely become cheaper still as new sources of supply are developed, and new tank ships are built, as they are being built, to transport the oil to this country. If the Company have a small set-back in profit, it will only be temporary ; and the concern is so sound and strong that we are able to meet anything that comes along.

The DEPUTY-CHAIRMAN (Mr. Walter Hunter), in seconding the motion, said the Chairman had gone so thoroughly into the whole of the accounts, that there was very little left for anyone else to say. He should, however, like to remark that, in conjunction with the Chairman, it was part of his duty to meet, at various times in the course of the year, the Profit-Sharing Committee, and also that of the Health Insurance Society. He entirely endorsed all the Chairman had said in regard to the admirable manner in which the Employees' Committees acted, and the good effect they had upon the working of the Company. He was very much struck, when attending one of the Health Committee's meetings, by the very energetic way in which the workmen themselves looked after, and endeavoured to guard against, malingering, in view of the many benefits conferred by the Health Society. It seemed to him that this was a very good feature, because it met a state of things which, it was feared, might arise under the Insurance Act. He sincerely congratulated the proprietors upon the state of the Company, which was due largely to the excellent way the General Manager and his assistants carried out their duties.

The motion was unanimously adopted.

Proposed by the CHAIRMAN, and seconded by the DEPUTY-CHAIRMAN, a dividend was declared at the rates per annum of £5 9s. 4d. per cent. upon the 4 per cent. stock and £5 6s. 8d. per cent. on the 3½ per cent. stock, in both cases less income-tax.

Mr. H. E. JONES moved the re-election to the Board of the retiring Directors (Messrs. W. G. Bradshaw, Walter Hunter, and R. Y. Bevan). He observed that he could not fully express the pleasure that it gave him to move the re-election of the grandson of the first Chairman of the Company whom he knew, and the son of his old and revered friend, Mr. Richard Bradshaw, who for many years worked with him in the administration of the Company. Glad, too, was he to propose on the present occasion the re-election of his old friends Messrs. Hunter and Bevan, the first of which names was identified with the East-end of London, and the latter of which was prominently identified with the financial work of the City of London. While on his feet, he should like to say—as an old officer of forty years' standing, and now for some years a "pensioner"—with what pride he regarded the progress of his old Company, which was so largely due to the assiduous, capable, and able services of the present Chairman, who, in addressing the proprietors every half year, he ventured to say, gave more information in less time than did any chairman of any other gas company. If he was not detaining the proprietors, he should like to refer to the occasion, at the great National Gas Exhibition at the White City, when the Metropolitan Gas Companies entertained at luncheon the members of the British Commercial Gas Association. In a speech at the luncheon, Mr. Charles Carpenter, who followed in the footsteps of his old friend, the greatest man who ever lifted his voice in the interests of the gas industry—Sir George Livesey—indicated the progress of the Commercial Gas Company as illustrative of how, without any undue advertisement or any wide publicity, the uses of gas could be developed in the arts and manufactures resident in the East of London, and in a way that commanded the serious attention of all other gas undertakings. It was his (Mr. Jones's) pleasure to know that Mr. Carpenter was perfectly right. There was a larger variety of uses in power and fuel of the gas of this Company than of that of any other company of which he knew (and he was connected with some thirty of them) in the kingdom. Now this had not been achieved without a good deal of personal attention, without a good deal of study, without a good deal of strenuous energy; and he was proud to think that the Chairman and his colleagues had been able to back up his (Mr. Jones's) own son, and those who worked with him, in this matter. The proprietors knew the East-end of London, and knew that the population was purely industrial, and one of workmen, and of small tradesmen who ministered to the wants of this particular class. As they had been told, in a community without much wealth (although the industrial establishments in which the people worked produced much wealth), they had over 87,000 coin meters in use among the working classes; and the rest of the consumers comprehended many large manufacturers who used the Company's gas exclusively and profitably in the prosecution of their industries. This was what Mr. Carpenter picked out for his illustration, and it was what caused those who were in charge of the proprietors' interests to deserve their very best thanks. The Chairman, with his usual lucidity, illustrated from the pages of "The Times" the great advantages of coke as a fuel. Personally, he (Mr. Jones) used next to nothing else for his fires. All of his friends who came into his house on a cold winter's night to warm themselves asked him how he got such splendid fires. His answer was "Gas coke, and nothing else." The Chairman did not say to them what he (Mr. Jones) wished to say—that, in such a serious emergency as the refusal to do their duty of the particular branch of misguided trades union workmen who dealt with coal, there was present in the midst of all great communities a gas-works at which existed a large stock of fuel, and existed not merely to make a profit, but because in the making gas it must be produced. During the recent period of inclement temperatures, when the coal porters and carmen declined to carry coal to hospitals and workhouses, the people were able to help themselves, largely from the gas-works. One gas-works with which he (Mr. Jones) was connected in the west of London was kept open all day one Sunday so that the poor people could fetch away little bags or sacks of coke ; and they did this to the extent of 28 tons. The mere fact that gas-works existed was a national safeguard at such times of peril.

Sir FREDERICK GREEN seconded the motion, which was cordially passed.

The CHAIRMAN, on behalf of himself and his re-elected colleagues, acknowledged the confidence of the proprietors, and the kind things said by Mr. Jones. In support of Mr. Jones's remarks, he (the Chairman) might say that the coal porters' strike and the cold weather combined had led to the output of gas in the early weeks of this year being 5¼ per cent. more than in the corresponding weeks of last year ; and they sold a great deal more coke than they usually did. At one time they had at one of their works a queue 2 miles long of carts and people waiting to be served with coke. Many who had through the coal trouble used coke for the first time would continue to do so.

Moved by Mr. HILLS, and seconded by Mr. WILSHAW, the retiring Auditor (Mr. G. W. Ilsley) was re-elected.

A vote of thanks was passed to the Chairman and Directors on the motion of Mr. M'Naught, seconded by Mr. Frank Jones.

The Chairman, having acknowledged the vote on behalf of himself and his colleagues, proposed a vote of thanks to the staff and workmen, coupling with it the names of the Engineer and General Manager (Mr. Stanley H. Jones) and of the Secretary (Mr. Bradfield). The proprietors, he said, had never had more cause than on this occasion to be satisfied with their men, and the Company were served as well as any company could possibly be. When he said this, justice made him add that this was not only due to what they did for the men, but was also owing to the good feeling engendered by the way the men were treated by their officers. Their Engineer was deservedly popular; and this was especially gratifying to him (the Chairman) because it was not accompanied by any relaxation of discipline.

The Deputy-Chairman seconded the motion, which was heartily passed.

Mr. Jones, on behalf of the staff and workmen whom he represented, said they were all much obliged to the proprietors and to the Chairman for the kind remarks he had made. He believed that a good deal of the excellent relationship that existed between them was due to the fact that he was bred into the Company, and the men had known him practically ever since. This fact helped matters a bit. The Company were well served. They had capable men on the staff, who were making their way to the front, and would be second to none in the future. They were mostly young fellows—able, hard-working, keen—and not only on the works, but in the district. To their efforts was largely owing the fact that the results before the proprietors that day were as satisfactory as they were.

Mr. Bradfield also responded for his staff and himself. In the course of his remarks he said that the Chairman had referred to the work done by the officers in connection with the profit-sharing and the various societies in which the men were concerned. Therefore he (Mr. Bradfield) made no apology for again alluding to the work, which was now becoming an absolute necessity in the administration of large public companies, and was a really important matter. Six months ago he referred to the large number of sickness claims they had been having in respect of their approved society; and he expressed the hope that this would be reduced in the later part of the year. He was glad to inform the proprietors that this had been the case. Although the saving had been small, yet the amount disbursed had been less, both in respect of sickness benefits and of maternity claims. He was, however, sorry to say that the sickness claims were still largely in excess of the estimates of the gentleman who drafted them for the Insurance Act. He hoped that in future years this would be improved, because he felt that the health of the men must be better for the attention they received immediately on becoming indisposed.

TOTTENHAM DISTRICT LIGHT, HEAT, AND POWER COMPANY.

The Half-Yearly Meeting of the Company was held at the offices, No. 639, High Road, Tottenham—Sir Corbet Woodall, D.Sc., in the chair.

The Secretary (Mr. E. Topley) read the notice calling the meeting; and the Directors' report and the accounts were taken as read.

A Good Increase and Prospects of Business Development.

The Chairman, in moving the adoption of the report and accounts, said he was glad to have the opportunity of meeting the proprietors again, and to present a report which was, in his opinion, a favourable one. It was true that the record of the Company's business in 1913, so far as it was reflected in rental increases, showed progress at a rather less rapid rate than that to which they had been accustomed. The year 1912 was, however, the one of the coal strike, and consequently abnormal. In 1913 they had to get ahead of increases in gas sold of 10·36 per cent. for June, and 12·78 per cent. for December in the preceding year. In face of these figures, increases of 8·29 per cent. and 4·87 per cent. might be considered as not unsatisfactory in an unusually mild year. The improvement in the district continued, though, so far, it had not led to very much building except in Palmer's Green and Winchmore Hill. There were said to be fewer houses now to let, and there was talk of fresh building estates being opened up; but the high price of materials still made the builders hold back. The following extract from Mr. Topley's annual report on rental and collection was, to his mind, peculiarly interesting. Illustrating the greater demand for houses, the coin-meter installations in empty premises on Dec. 31 were instructive. These numbered in 1910 4724; in 1911, 4373; in 1912, 2789; and in 1913, 2366—a decrease of 15·16 per cent. in the last year.

The Amalgamation of Enfield.

The accounts now submitted were the last of the Tottenham and Edmonton Gaslight and Coke Company. The concern had now become the Tottenham District Light, Heat, and Power Company; and all future accounts would include those of Enfield, and would be influenced to some extent by the electrical undertaking. The present position of affairs was worth comment, because the supply of gas in Enfield was one of the objects of the Tottenham Company as was stated in the preamble to its Act of 1859. Enfield, however, was not included at that time. A few years later the Tottenham Company took the retrograde step of ceding some of its territory to Enfield, and at the same time practically abandoned its right to supply in Hornsey and a part of Southgate, allowing new and competing companies to spring up within its area. The amalgamation with Enfield was a step towards reversing the policy of fifty years ago. The proprietors would be interested to hear that, although the mains were not yet connected between Tottenham and Enfield, and would not be for six or eight weeks, the Board had already received a certain amount of praise for improvement, and a good deal of complaining as to deterioration in the quality of the supply. Active steps were being taken to localize any faults that existed; and he hoped that before another winter they would be able to give complete satisfaction to their new friends in Enfield. In the meantime, other facilities were being provided for them. New show-rooms and offices would be erected in Enfield Town, and already a shop had been purchased in Ponder's End, which would immediately give facilities to many of the Enfield consumers to procure modern appliances on the terms which had made the Company's system in Tottenham and Edmonton so popular.

Capital per Million Cubic Feet.

Last year he pointed out that the capital per million cubic feet of gas sold had about reached low-water mark, and that an increase must inevitably take place. So far, however, this had been very slight, as a comparison of the following figures showed: In December, 1912, the capital stood at £387 per million cubic feet; in June, 1913, at £380; and in December, 1913, at £389. With the addition during the current year of the Enfield capital, there would be a considerable rise.

The Working Results and the Revenue.

Turning to the accounts, it would be noted that they had used less coal by 2551 tons. The quantity of coal gas made was 18,880,000 cubic feet less. The production per ton was the largest on record—viz., 13,205 cubic feet. They had produced 34,003,000 cubic feet more carburetted water gas; and in doing this had used an additional 763 tons of coke and 73,927 gallons of oil. The private gas-rental from ordinary meters was slightly down. This was chiefly accounted for by the reduction of prices. The return from slot meters showed an increase of £3285, notwithstanding the lower price. The total quantity of coke for sale was less than in the corresponding half year; but this was accounted for by the smaller quantity of coal used. The price of coke had receded by 1s. 2d. per ton since last half year; and the difference would have been still greater but for the fact that the outstanding balances of last year's contracts had helped to maintain a better average. Tar showed a reduction in its contribution to revenue, but last year's quantity was abnormal, which accounted for the apparent falling away; this year's price having been very good—viz., 2·12d. per gallon. In sulphate of ammonia they had done fairly well as to quantity; but the price had unfortunately gone below that which was obtained in the previous twelve months. The changing conditions of the neighbourhood, and the more extensive use of gas for cooking, heating, and power purposes were noticeable in the fact that the consumption on Sundays was now often larger than the consumption on the Monday. On eight occasions during the past half year, this phenomenon occurred, and, combined with the fact that Friday had now frequently a heavier consumption than Saturday, upset the calculations based on earlier data. It was necessary when considering the accounts to bear in mind that the 1d. reduction in price, compared with the previous year, accounted for £4074, yet the return from gas showed an increase of £1440. The rents of meters, stoves, &c., also exhibited an increase of about £1500. Residuals were down in price, partly owing to the reduced value of coke and ammonia, and partly to the fact that the percentage of coal gas was slightly lower.

Working Expenses, Automatic Lighters, and a Ten Years' Public Lighting Contract.

Owing to an increase in the cost per ton of coal of 2s. 5¾d., and in the price of oil per gallon of ¼d., materials cost 0 86d. more than during the corresponding period of last year. Some of the working expenses were slightly down; the most remarkable being public lighting. If they divided this figure, which included depreciation on the automatic lighters by the number of lamps, they found that it came out at 5s. 6d. per lamp for the half year. This took no account of the gas saved. Owing to the use of these automatic lighters, they had been able to reduce the price of gas for public lighting to the benefit of the ratepayers, and had succeeded in securing a contract with the Tottenham Council for a period of ten years. The total of the expenditure showed a reduction which worked out at the rate of 0·36d. per 1000 cubic feet. Although, under the circumstances of the half year, it had not been desirable to add anything either to the renewal or the insurance fund, yet they had paid £3000 to the parliamentary costs out of revenue; and it was very satisfactory to be able to pay the full statutory dividends—only reducing the undivided balance by a matter of £4500.

Pension Fund.

In the closing months of last year, a pension fund for all co-partners, and therefore for practically all employees of the Company, was established. It had been the custom in the past to grant pensions to old employees when no longer able to work, and to consider each case individually. The Directors thought that the time had come for the establishment of a fund, to which members should contribute, to provide pensions for all employees at a given age. In considering the possibility of such a scheme, it appeared that it could be best worked in connection with the co-partnership system which, at Tottenham, owing to continuous reductions in price, had prospered exceedingly, and now yielded to co-partners a bonus of 9 per cent. on their salaries or wages. Briefly, the provisions of the fund were that members contributed 3 per cent. or 4 per cent. of their salaries or wages. (according to age at entry) to the fund, and that the Company contributed a sum equal to the subscriptions of the members. In order to make the subscriptions by members easier to meet, two-thirds of the amount payable was charged to their co-partnership bonus, leaving them only one-third to pay in cash. The pension provided by the fund was one-sixtieth of the member's salary or wages on retirement for each year of service with the Company, with a maximum of forty-sixtieth or two-thirds; the pension age being 65. Thus at 65 a man who had been forty years with the Company would receive a pension for life of two-thirds of his salary or wages at retirement. At a general meeting of co-partners held to consider the matter, the proposal was enthusiastically received; and at their own request the whole of the two-thirds subscription was, as he had already said, to be charged to the withdrawable part of the co-partnership bonus. To existing co-partners the matter was left entirely optional; but 98 per cent. had joined the fund, which was inaugurated on Jan. 1 this year.

Present and Future.

He was glad to report that the relations between all classes of the employees and the Directors continued to be of the most pleasing

character, and that the same might be said in regard to local governing bodies and the public. The reduction of a further 1d. per 1000 cubic feet in the price of gas from the commencement of the present year fulfilled a promise made to the Tottenham District Council when the terms of the Company's last Act of Parliament were in process of settlement. Although they would for the current half year have to draw again on the reserves in order to pay the dividend, these reserves were strong enough to meet more than one such call. Looking to the future, it was satisfactory to note that the price of coal was falling, and that this, the prime cause of the reduced profit of the half year, would at least be modified after the termination of the current contracts. He had already reported that very considerable extensions of works were in progress; the most important of these—a large new gasholder—had been started, the tank being already well advanced. Additional capital would be required to meet these extensions; and there would be an issue of "B" stock in the course of a few weeks' time.

The DEPUTY-CHAIRMAN (Sir Daniel F. Goddard, M.P.), in seconding the motion, said there were two matters of outstanding importance in the report—one was the inauguration of the superannuation scheme (which the Chairman had explained so fully and completely), and the other was contained in a paragraph of the greatest brevity in the report. It said that "in accordance with the provisions of the Tottenham and Edmonton Gas Act, 1913, the Enfield Gas Company was amalgamated with this Company from Jan. 1, 1914." With such a small paragraph in the report, it looked as if this event had little meaning, whereas he considered that it was a matter of very great importance. It had involved a large amount of thought, a great many negotiations, and much consideration, and he thought the proprietors ought to realize that this happy result was due mainly to the foresight, the experience, and the love of fair play (which went so far to smooth away difficulties, and which made everybody happy, satisfied, and contented) of their Chairman. He (Sir Daniel) ventured to think that the combination of the two large and growing districts would never have been accomplished had it not been for the wisdom and the attention which had been given to it by their esteemed Chairman. He thought that they, as proprietors and co-partners in this undertaking, ought to congratulate him and themselves on the success which had crowned his efforts.

The motion was unanimously carried.

Proposed by Mr. H. BAILEY, and seconded by Mr. J. RANDALL, dividends were declared at the rates per annum of 7⅜ per cent., on the "A" consolidated stock, and 5⅞ per cent. on the "B" consolidated stock, both less income-tax. In his remarks, Mr. Bailey said that during the half year they had had a great many difficulties; and the Chairman had had to bear the brunt of most of them. But in regard to the results of the trading, the Board looked forward with confidence to doing better in the future. Coal and coke had not gone together as they ought to have done. Coal had been dear; and coke correspondingly cheap; and this had diminished the profits. They hoped this state of things would not continue. The Board would soon be issuing some more stock, at a minimum price which would not be a high one. When they made the last issue, no one got any at the minimum mentioned; and so he advised the proprietors to offer next time a little more than the minimum. While the Board liked to see outsiders come in, they preferred to see the present proprietors increasing their holdings

Mr. REID moved—"That this meeting having heard the statement of the Chairman with regard to the co-partners' pension fund expresses its hearty approval of the same." He said that he had had personal experience of the relations existing between the heads of the Company and the co-partners; and he did not know of any other Company who could surpass them in their combined efforts. He was sure that the scheme would be of advantage to everyone concerned in the Company.

Mr. F. R. SMITH, in seconding the motion, said that, having been on the Co-partnership Committee of the Enfield Company, he was pleased to know that the men were entering into a co-partnership system which was working so well.

The CHAIRMAN observed that it was with great satisfaction that he heard the resolution which had been proposed.

The motion was very heartily agreed to.

Mr. H. D. ELLIS moved that the thanks of the proprietors be given to the Chairman, Directors, and Auditors, and to the officers, staffs, and workmen for their services during the half year. He observed that the administration of a strong gas company was a very pleasant task when everything was going well—when coal was at its cheapest, and when the residuals markets were firm, and when they had a severe winter to stimulate the demand for gas, when, in fact, every factor that made for prosperity was beneficent and smiling. But there was a reverse to the medal; and they had had that side presented to them in the past half year. The Directors had indeed had an anxious and arduous time. They had had to face an addition to the price of coal of about 2s. 6d. per ton, as compared with the corresponding period of 1912, the price of residuals had also gone down considerably, and, instead of a winter, they had had a most balmy and spring-like season, which had reduced the demand for gas. Therefore, while they returned grateful thanks to the Directors for the fine result they had put before them in spite of all the difficulties they had encountered, he thought they should also show them sympathy, because they must have had a great deal of anxiety. Having expressed the opinion that no gas company—not even a strong one—was going to make the amount of profit required for dividend in the current half year, Mr. Ellis spoke of the excellent services of Mr. Broadberry, Mr. Topley, and the other officers, and the workmen. He was glad to hear from the Chairman that the Board and the officers were on such excellent terms with the workmen. It could not be otherwise when they considered what the Company did for their men. Under the profit-sharing scheme, the men obtained a bonus of 9 per cent. on their wages; and the pension fund was a great boon. Advantages such as these could not fail to attach men to the Company.

Mr. G. OSBORNE seconded the motion, which was put and carried unanimously.

The CHAIRMAN, replying on behalf of his colleagues and himself, said Mr. Ellis was quite right in saying the half year had been a strenuous one, following as it did upon one almost equally trying. For three half years they had been paying far above the normal prices for coal; and, in the current half year, the whole of the coal they would be using would have been purchased at the last and highest prices; so that there could be no question but that they would have to again draw upon the reserves in the current half year. He thought the Directors might claim credit for having accumulated sufficient in the past to make the proprietors look upon further calls upon the undivided balance with perfectly easy minds. With regard to the Bill which had now become an Act, and which incorporated the Enfield Company in their own, he thought he might say that he rarely had had professional business through his hands that had given him greater satisfaction, covering as the Bill did other matters besides the amalgamation of Enfield. It was a great satisfaction to him that the Bill went through unopposed, or practically unopposed, as there was only a neighbour who thought the Company would interfere with his comfort who opposed. That all the local authorities gave their assent to the terms of the Bill was an evidence of the position the Company had established in their confidence and respect. This he valued very highly indeed. He should like it to be understood that it was no indifference on the part of the local authorities that accounted for this. For instance, he had a conference lasting nearly a couple of hours with the Tottenham District Council, at which every part of the Bill was discussed in a most thorough manner. As he had mentioned in his address, the reduction in the price of gas which took place on Jan. 1 was one of the terms that the Council were pleased to have—he would not say, as a condition of their assent, but as accompanying their consent. With regard to the amalgamation of the Enfield Company with this Company, an immediate result would be a considerable saving to the consumers in the district of Enfield, so that the local authority there were perfectly content to approve the amalgamation; and the Directors saw, so far as this Company were concerned, a considerable financial advantage from it. One asset, he felt, was that they had an addition to the Board, in the person of Mr. Ford, who was one of the Directors of the Enfield Company. They had not had a long experience of him as a colleague; but what they had had satisfied them that they had in him an acquisition of great value to the amalgamated Company. Reference was gracefully made by Mr. Ellis to Mr. Broadberry; and it would interest the proprietors to know that Mr. Broadberry was now both Engineer and General Manager of the Company. He (the Chairman) was sure that in both capacities he would be worthy of the trust they always reposed in him. He was also sure that it would be a satisfaction to all the officers and men of the Company to know that they were remembered by the proprietors—might he say especially that this vote was well due to their friend the Secretary. During the preparation, and the carrying through of the Bill, he had an enormous amount of work on his hands, but nothing was ever behind in his department.

Mr. BROADBERRY acknowledged the vote on behalf of himself, his staff, and the workmen; and, at the request of Mr. Topley, he also responded for him and his staff. He added that, notwithstanding all the difficulties that had been mentioned as facing gas companies at the present time, if the proprietors asked Mr. Topley or himself if they were downhearted, they would answer him with a hearty "No."

NEWCASTLE-UPON-TYNE AND GATESHEAD GAS COMPANY.

In view of the forthcoming meeting of the shareholders of this Company on Tuesday of next week, the Directors have issued their report, together with the accounts for the year 1913.

The revenue was £513,453, and the expenditure £393,453. The profit thus shown is added to the balance carried forward from the previous year, making a total of £131,414. After allowing for the payment of interest on debentures, loans, &c., and dividends for the year at the rate of 4 per cent. on the preference stock and 4½ per cent. on the ordinary stock (amounting in all to £110,589), there will be a balance to be carried forward of £20,824.

The quantity of gas sold during the year was 3,290,613,000 cubic feet—exceeding all previous records and being an increase over 1912 of 183,468,000 cubic feet, or 5·9 per cent. The revenue from gas was £297,149, against £281,352 in the previous year; and from residuals, £158,954, against £156,848. Owing to increased carbonization and higher prices, coal and oil cost £26,765 more than in 1912.

The first portion of the 5¼ millions per day vertical retort plant at the Elswick Gas-Works has been in operation since Jan. 18, 1913; and the working results have been such that a contract has been made for the erection of the remainder, half of which is to be completed this year and the other half next year.

The numbers of consumers, and apparatus out on hire on Dec. 31, were as follows:

Consumers	120,463,	being an increase of	2,538
Cooking-stoves	71,688,	,, ,,	2,492
Grillers	9,282,	,, ,,	490
Gas fires	9,322,	,, ,,	3,028

The Directors express their regret that by the death of Mr. William Sutton (who was elected to the Board in 1902) they were deprived of the services of a much-valued colleague. To fill up the vacancies upon the Board, appointments have been made of Mr. J. W. Ellis in the place of Mr. U. A. Ritson, whose resignation was referred to in the last report, and of Lieut.-Col. William Henry Ritson in the place of the late Mr. William Sutton.

Water for Fire Extinction in London.—At the meeting of the London County Council to-day, the Fire Brigade Committee will present a long report on this subject, in which they suggest a further conference between representatives of the Council and the Metropolitan Water Board to see if a settlement by consent can be arrived at on the subject of the inadequate supply of water in some localities. They think it improbable that the Council could promote successfully legislation placing on the Board the obligation to provide at their own cost all mains and extensions of mains necessary for fire-extinction purposes. It seems clear from legal advice that no statutory responsibility for the provision of an adequate supply of water rests upon either the Council or the Board.

SOUTH SUBURBAN GAS COMPANY.

Half-Yearly Report and Accounts.

The following is the report of the Directors of the Company for the half year ended the 31st of December, which will be presented at the ordinary general meeting on Friday next.

Dearer coal, combined with lower prices for residuals—especially coke—has seriously reduced the trading profit; so much so, in fact, that, but for the likelihood, owing to the falling off in the trade of the country, of coming contracts for coal being made at lower rates, an increase in the price of gas would have become inevitable.

The net revenue account shows that, including the balance brought forward from last half year—namely, £14,574 10s. 2d., and after providing for debenture and other interest, the amount available for dividends is £41,000 2s. 4d., out of which the Directors recommend payment of the full statutory dividends, as under: On the 5 per cent. preference stock, 5 per cent. per annum; on the 5 per cent. ordinary stock, 6 per cent. per annum; on the 5 per cent. West Kent stock, 5¼ per cent. per annum—leaving to be carried forward to next half year £7428 15s. 4d.

The exceptionally fine weather in the autumn and early winter had the natural effect of lessening the demand for gas. Nevertheless, the sales show an increase of 2·04 per cent. as compared with the corresponding period of the previous year.

There has been a continuance of activity in the securing of new business; 2423 consumers having been added during the half year, and 4678 additional cookers, fires, &c., fixed. High-pressure lighting is also in increasing request.

The Directors have secured, on terms which they are advised are reasonable, about 189 acres of land at Belvedere, having both rail and river frontage. A Bill to empower the Company to hold and use this land for gas-works purposes will be submitted for the approval of the proprietors at the special meeting of which notice has been given.

Two Directors (Sir J. Fortescue Flannery, Bart., M.P., and Mr. John Boraston) retire from office at this meeting, and, being eligible, offer themselves for re-election. One Auditor (Mr. Samuel Wood) also retires, and, being eligible, offers himself for re-election.

Mr. George Ross, the retiring Employee Director, has been re-elected by the employees without opposition.

The accounts accompanying the report show that the total capital expenditure at the close of the half year (including the nominal amount added by conversion) was £1,382,279, or £3379 less than the receipts—viz., £1,385,658, inclusive of the premium capital. A sum of £19,284 was expended on capital account in the half year. The revenue from the sale of gas was £126,299; the rental of meters, stoves, and fittings produced £17,355; the sale of residuals, £50,262; and the total receipts were £194,230. The following were the principal items of expenditure: Gas manufacture, £106,009; distribution, £32,965; management, £7873; rents, rates, and taxes (£8561); miscellaneous items bringing up the total to £163,211. Among the items is £3000 charged on account of the co-partnership scheme. The balance carried to the net revenue account is £31,019; and the amount available for dividend is £41,000.

The statements as to working show that, under the supervision of Mr. S. Y. Shoubridge, the Engineer, 86,750 tons of coal were carbonized in the half year. The quantity of gas made was 1,122,788,000 cubic feet—all coal gas—of which 1,015,910,800 cubic feet were sold and 95,126,200 cubic feet were accounted for. The residuals made were: Coke, 1,127,750 cwt.; breeze, 24,126 yards; tar, 859,992 gallons—the make of sulphate of ammonia being 1005 tons.

The Banbridge Gas Explosion.—It was announced at a meeting of the Banbridge Urban District Council last week that the Carnegie Hero Fund had granted £10 and an honorary certificate, and the Society for the Protection of Life from Fire £3 3s. and a certificate, to Hugh Adamson, an employee at the Banbridge Gas-Works, in recognition of his bravery in rescuing the late Mr. George A. Mearns, the Manager, on the occasion of an explosion in the works.

Dublin Gas Company's Electric Lighting Bill.—The Dalkey Urban Council have joined the Dublin Corporation and the Kingstown and Blackrock Urban Councils in deciding to oppose the Alliance and Dublin Consumers' Gas Company's Electric Supply Bill. Mr. M'Donald, Law Agent, informed a meeting of the Council that, if the Bill became law, Dalkey would be entirely at the mercy of the Gas Company, who would not be bound to supply electric light to the township. Mr. Bailey said the Bill was purely an obstructionist one; the Company had never any intention of supplying electric light.

Salford's "Unfortunate" Electric Undertaking.—A proposal of the Salford Electricity Committee to advertise for a new Engineer at a salary of £1000 per annum evoked some opposition in the Council, though ultimately it was agreed to. It was pointed out that the difficulties at the generating station were such that it might even be expedient to secure a new site. They therefore wanted expert opinion, and it was necessary to have a man in whom they could place the fullest confidence. Alderman Phillips said the question was whether they could, by paying a high salary, get a man who could lift this unfortunate undertaking out of the rut in which it had been for so many years.

Burnley Gas-Workers' Wages.—The Gas Committee's concessions, amounting to £1030 per annum, to their 300 employees who made demands aggregating £2276, came up for consideration at the last meeting of the Burnley Town Council, and were confirmed by a majority of six votes. The employees have had another meeting, at which the Gas Committee's concessions were reported upon. While these were looked upon with satisfaction, it was decided to press for 6½d. per hour for labourers, for the pipe jumpers and coke wheelers a minimum of 5s. per shift, for fire heaters and water-gas assistants 4s. 6d. per shift, and for retort scurfers another ½d. per hour. Other concessions in the way of re-arrangements of duties are also wanted. On receiving the Committee's reply, a vote of the men will be taken.

SALARIES OF BIRMINGHAM GAS ENGINEERS.

Recommendations by Committees of increases in the salaries of a number of officials came before the Birmingham City Council at their quarterly meeting last Tuesday.

Alderman Sir Hallewell Rogers, in presenting the report of the Gas Committee (who recommended that the salary of Mr. J. Foster, Engineer of the Windsor Street Works, be increased from £800 to £900 per annum, that of Mr. W. Chaney, Engineer of the Saltley Works, from £800 to £900 per annum, and that of Dr. W. B. Davidson, Engineer of the Nechells Works, from £700 to £800 per annum, all from Jan. 1), emphasized the fact that, as expressed in the Gas Committee's report to the Council five years ago in connection with the reorganization consequent upon the retirement of their Engineer-in-Chief, the Committee were of opinion that the salary attaching to each of these important positions should ultimately be advanced to a maximum of £1000 per annum. During the last two years, he said, extensive works of construction and reconstruction had been carried out at all of the three works named, in order to meet the remarkable growth in the demand for gas; and the Committee felt that the increases recommended were fully justified. The Birmingham undertaking, he pointed out, was the largest outside London. During the past five years, notwithstanding substantial reductions in the price of gas, the department had contributed practically £400,000 to the relief of the rates. These results had been due in no small measure to the zeal and energy displayed by the officers of the department. It was quite true that the Committee laid down the policy on which the undertaking was worked, though this was done largely on the advice of the officials; but the profits were earned by the economical carrying out of this policy. It was the constant endeavour of the Engineers to obtain the largest quantity of gas and residual products from every ton of coal carbonized; and the three Engineers in question had been very successful in this respect. The make of gas per ton of coal carbonized for the year ended March 31, 1913, was 1101 cubic feet more than that obtained in 1907—representing a saving of practically 65,000 tons of coal. The Council would realize also that they could not afford to have second-rate officials, when he pointed out that the ability to save 1d. per 1000 cubic feet of gas represented on the present output no less than £40,000 saved to the city. As to Mr. Foster, he had been in the service of the department since November, 1902, when he was appointed Works Engineer at Windsor Street. During the period of his control of the works, he had carried out many important improvements, and the total cost of gas at the works was 50 per cent. less last year than in 1902. The cost of manufacture alone, due to economies effected, and notwithstanding increases in wages, showed a decrease of 25 per cent. Mr. Chaney had been in the service of the department for upwards of fourteen years; and the Committee could not speak too highly of his ability and energy. With regard to Dr. Davidson, his scientific knowledge had been of considerable advantage to the department; and his researches and experiments had enabled him to institute many economies.

The recommendations were agreed to; an amendment that Dr. Davidson's increase be only £50 (on account of his short service) being defeated.

Subsequently Sir Hallewell Rogers remarked that it was too early to forecast accurately the effect of the increased cost of materials, especially coal and oil, upon the finances of the department; but the Council must be prepared for a substantial reduction in the contribution to the rates this year.

GAS MATTERS AT LEEDS.

New Manager Appointed.

Several matters relating to the business of the Gas Department were discussed at the monthly meeting of the Leeds City Council last Wednesday—among them being the appointment of a Manager in place of the late Mr. R. H. Townsley.

Alderman RATCLIFFE, replying on behalf of the Chairman of the Gas Committee to a question as to what abatement would be made in the gas charges for the past quarter in view of the serious increase in the charges and the reduced illumination of the gas which was supplied, said a good deal of misconception was prevalent on this matter. It had been stated that the mains had been filled with air. This was perfect nonsense. The mains were never empty at all; at least a million cubic feet of gas having been always in stock. Out of a total of 61,000 ordinary consumers, only 350 complaints had been received; and upon investigation it was found that the charges covered a much longer period than usual, for the reason that the checking of the meters in December was much delayed by the men being on strike. This would right itself in the coming quarter. He added that at one period an infinitesimal quantity of air got into the mains owing to the fact that many hundreds of street-lamps were turned on, either by the strikers or somebody else, without being lit.

Alderman RATCLIFFE next moved a special resolution appointing Mr. W. J. B. Leech to be Manager of the gas-works, at a salary of £800, subject to an agreement of service being entered into to the satisfaction of the Committee. He said there were 33 applicants for the position; and the Committee had come to the conclusion that Mr. Leech, who was 38 years of age, was the best man. He had had wide experience, not only in this country but abroad, and had had charge of two big installations of new plant for the Edinburgh and Leith Gas Commissioners—possibly the largest piece of reorganizing work that had taken place in this country, involving together an outlay of three-quarters of a million of money. There was no known system of gas production that Mr. Leech had not mastered. He was at present head of the firm of Messrs. Leech, Goodall, and Co., of Hunslet, who had an enormous amount of work in hand. Mr. Leech, however, would, if appointed, take immediate steps to sever his connection with the firm, and withdraw all his capital from it. It was well known, further,

that the firm had been erecting vertical gas-retorts for the Leeds Corporation; and as the guarantee tests had not yet been made, it was important to observe that these tests would be made independently, and Mr. Leech would have no control over them.

Mr. G. H. MORRISON, while not opposing the selection, said that he hoped no agreement would be entered into with Mr. Leech that would enable him to advise other authorities or private concerns, unless it was provided that the fees so received were paid to the Corporation. Agreements with certain existing officials did give this permission, provided the sanction of the Chairman of the Committee concerned was obtained. But he was entirely against the system, believing that the interests of the city would be better served by payment of an adequate salary, and by insisting that the officials should give their whole time to the service of the city.

Alderman TETLEY, on this matter, took an opposite line, arguing that it was to the advantage of the city that its chief officials should gain all the extra experience possible.

Mr. W. WOOD asked whose installations Mr. Leech had been in charge of. He also said that the new Manager should co-operate as much as possible with the existing foremen and others who understood the city's system.

Mr. A. MASSER approved the appointment, and generally agreed with Mr. Morrison's stand as to the outside work.

Mr. J. S. HINCHCLIFFE supported the motion, adding that the city's gas plant was deplorably out of date, whether from the policy of taking too much of the profits in the past, he would not say.

Alderman RATCLIFFE: That is the secret.

Mr. HINCHCLIFFE insisted that the aim of the new management must be to improve the quality of the gas, and bring down the price at which it was sold.

Mr. D. B. FOSTER suggested that when managers of departments went away to give advice to other communities, part of the fees should go to the Corporation. Mr. Hinchcliffe had said the Council must have a man with efficient control over the men. He hoped this significant phrase did not mean that mastery and denomination were going to be the characteristics of Mr. Leech. If he did, Mr. Leech had better understand that he would be faced with those in the Council, and in the city, who were not going to be bullied in any way. [This remark was resented by several members of the Council, and the speaker was requested by more than one member to withdraw unfair insinuations against Mr. Leech.] Mr. Foster said he was expressing no judgment on Mr. Leech; but the Labour party did not want to see South African methods employed in the management of the gas-works. What was wanted was a man who had strength to secure from the employees the efficient discharge of their duty.

Alderman RATCLIFFE said no member of the Committee would have voted for Mr. Leech if there was any probability of his playing the part of a bully. With regard to Mr. Hinchcliffe's description of the position of the gas-works as "shocking," it might at least be pointed out that in the 1912 returns Leeds had come out in the first flight of large municipalities as to cost on every controllable charge. He agreed, however, that the recent strike had done considerable damage all through the works.

The resolution was carried unanimously.

A SALFORD GAS DEPUTATION.

A Proposed Vertical Retort Installation.

The action of the Gas Committee in sending the whole of the members, with two exceptions, on visits of inspection to other towns, formed the subject of a long discussion at last Wednesday's meeting of the Salford Borough Council. The matter arose on a Standing Order, which limits the number of a deputation to five, except by the sanction of the Council. The visits of inspection were in connection with a proposal of the Committee to instal, at the Regent Road works, a new system of vertical retorts, at a cost of £25,000. Before accepting a tender, the Committee decided to pay visits of inspection to Southport, Bradford, Bolton, and Birmingham, to inspect such retorts in operation, in order to decide upon the best type to use. Except Birmingham, all the places mentioned have already been visited; and more than five of the Committee went on each visit, without the consent of the Council.

Mr. Bratherton moved that the minutes of the Gas Committee should be confirmed, with the exception of the clause referring to the arrangements for these visits.

The Chairman of the Committee (Alderman F. S. Phillips) said that the installation of the new retorts would not only pay for itself, but would leave an additional profit. There were, however, two types of vertical retort under consideration; and they had not yet decided which to adopt. As it was difficult for men who had not seen the retorts to come to a decision, it was thought best for the members of the Committee to visit places where they were in use, and see for themselves. They did not regard the visits as deputations, as the members returned the same day.

Mr. Bescoby said there appeared to have been a flagrant and deliberate violation of a Standing Order. What he wanted to get at was the difference between a deputation and a committee of inspection.

The Town Clerk, on being asked for a ruling, decided that a deputation had been sent, and that the Committee had contravened the Standing Order.

Mr. Bratherton's proposition was carried; but it was decided to allow the Committee to visit Birmingham, and to pay the expenses of the previous visits. During the discussion, Mr. Willett stated that if it had been any other Committee than the Gas Committee, nothing would have been said on the matter. There had for years been members of the Council who had systematically opposed everything the Gas Committee had done. It was the outcome of a paltry and mean spirit. If they did spend £20, and saved £3000 by doing so, was it not worth it?

Lurgan Gas-Works Purchase.—The Lurgan Urban District Council have approved of the recommendation of the Council in committee that steps be taken to purchase the works of the Lurgan Gas Company.

READING PUBLIC LIGHTING.

A Ten Years' Gas Contract Recommended.

An important discussion was begun (and then adjourned for a week) by the Reading Town Council at their quarterly meeting last Thursday. The subject was the public lighting; and it arose on a report regarding the public lighting made by the Public Streets Improvement Sub-Committee to the Highways and Lighting Committee, who recommended the Council to adopt it. The report was in the following terms.

We have further considered the tenders received from the Reading Gas Company and the Reading Electric Supply Company, Limited, for lighting the streets in the borough other than those in the parish of Caversham, and submit herewith a tabulated statement we have had prepared to enable the Council to compare them. It will be seen from this statement that the tender of the Gas Company amounts to £5381 per annum, and the tender of the Electric Supply Company amounts to the sum of £5350 per annum; so that the tender of the Electric Supply Company is £31 lower than that of the Gas Company. But since the tenders were submitted the charge for gas to ordinary consumers in the borough has been reduced; and the Gas Company, in a letter to the Town Clerk, dated July 23, 1913, state that if the Corporation decide to adopt inverted incandescent burners for street lighting, the gross annual saving on the prices tendered for the existing number of lamps will amount to £78 10s. for the period of ten years. In each case, the amount quoted covers the cost of the necessary alterations to 2322 street lamps now in use in the area to be lighted, the supply of 884 new lanterns, the adaptation of 1438 existing lanterns, as well as the lighting, extinguishing, cleaning, and maintenance of the lamps, but in neither instance does it include the cost of renewing any lanterns, except in cases where they are damaged by the Company's servants. In the case of the Electric Supply Company, the sum quoted includes the laying of the necessary mains and the reinstatement of street surfaces.

As regards any additional lamps which may be required during the currency of the contract, we are advised by the Borough Surveyor that nearly all of them would be 3½ cubic feet gas-burners or 2-40 watt electric lamps; and as the Gas Company quote £2 0s. 7d. per lamp per annum for additional lamps fitted with 3½ cubic feet burners, and the Electric Supply Company quote £2 10s. 6d. per lamp per annum for 2-40 watt lamps, the tender of the Gas Company for the provision of these additional lamps is 9s. 11d. per lamp per annum lower than that of the Electric Supply Company. Furthermore, the sum quoted by the Gas Company for the erection of additional lamps is £1 17s. 6d. lower than that of the Electric Supply Company. As regards the cost of additional triplex and duplex lamps, the tender of the Electric Supply Company is lower by 2s. 2d. and 8s. per lamp per annum respectively than that of the Gas Company; but the Gas Company's charge for erecting the lamps which they would supply would be £1 12s. 6d. and £1 15s. per lamp lower than the charge which would be made by the Electric Supply Company.

We are satisfied that the Gas Company's tender is the more favourable to the Corporation, both as regards cost and illumination; and we therefore recommend its acceptance for a period of ten years from April 1 next.

MACCLESFIELD CORPORATION GAS SUPPLY.

At the Monthly Meeting of the Macclesfield Town Council last Wednesday,

Aderman Isherwood, moving the Gas Committee's minutes, said the works were now in perfect condition. One of the thirty-two new vertical retorts would produce six times as much gas as one of the old ones, at a third of the labour cost. This was worth something to the consumers. Notwithstanding the trouble they had had [see "JOURNAL" for Dec. 23, p. 960], the consumption for the nine months to the end of last year was 153 million feet, as compared with 149 millions the previous year; and he believed that the consumption in January constituted a record. The gas produced to-day was better and purer than at any previous time—in consequence, he said, of the new retorts. The coal used would also cost less, while the results would be greater. The new plant had now been completed as near as could be for a sum of £15,000, without a penny burden on the ratepayers or an alteration in the price of gas. The gas-works were first built in 1818 by a private Company. In 1840 the price charged was 7s. 6d. per 1000 cubic feet. In 1860 the Corporation bought the undertaking for £50,000; and nearly this amount had been spent on enlargements and improvements. There was now a debt on the works of between £50,000 and £60,000. It was proposed by the Corporation to spend something like £43,000 in the near future in various ways; and their "grand gas-works" would help the ratepayers to bear the burden and pay some of the interest. At the same time, the interests of the consumers would not be forgotten. In 1860, when the Corporation took over the undertaking, the price of gas was 4s. 6d. per 1000 cubic feet; at present, it was just one-half.

After some remarks as to the quality of the gas supplied, and some questions having been answered regarding the lighting of the borough streets, the minutes were passed.

The "Macclesfield Times" refers to the report of the Gas Engineer (Mr. William Newbigging) upon the recent failure of the gas supply, which appeared in the minutes of the Gas Committee referred to above. It was, they say, a brief statement, compiled with an evident desire not to say too much in view of the fact that the difficulties are not yet at an end. After explaining the causes of delay in completing the plant, Mr. Newbigging states: "Considerable difficulties were experienced practically from the start, and culminated on the 16th and 17th of December in a shortage of gas to the town. The plant was, and is still, in the hands of the Contractors. The principal difficulties experienced have been the hanging-up of the coal in the top of the retorts, and the pitching of the mains. In addition to these troubles there are certain structural defects which have still to be remedied The contract provided that in the event of any matters in dispute between the Corporation

and the Contractors, such matters are to be referred in the first instance to me, and either party have the further right to appeal to the President of the Institution of Gas Engineers. The Contractors are remedying the defects before named, and are carrying out a test of the plant prior to handing same over to the Corporation. I am reserving my decision as to the question of liability of the Contractors for the loss sustained by the Corporation until they have remedied the defects and expressed themselves ready to hand over the plant." The penalty provided for in the agreement between the Corporation and the Contractors is £500 per week, and a statement is being prepared by the Borough Accountant showing the loss incurred by the Corporation and the town generally during the stoppage. Notwithstanding the difficulties that have arisen, the members of the Gas Committee believe that eventually they will be able to supply better gas and effect a great saving to the town.

MOND GAS SUPPLY IN SOUTH STAFFORDSHIRE.

The Thirteenth Ordinary General Meeting of the South Staffordshire Mond Gas Power and Heating Company, Limited, will be held at Dudley Port, Tipton, on the 28th inst.

The Directors will submit the audited accounts for the year 1913, during which time the number of customers supplied increased from 134 to 145. Connections are being put into several works; and many customers are increasing their demands, so that the quantity of gas sold last year was 12½ per cent. more than in 1912. The profit on revenue account was £11,252—a decrease of £1816 as compared with 1912. But, having regard to the adverse circumstances with which the Company has had to contend during the year—more especially the greatly advanced cost of fuel and wages, which has very much increased the cost of manufacture and has more than equalled the whole of the increased revenue derived from the sale of gas during the year, the strike in the tube and other trades of the district during the summer, and the interest on capital expended on the extensions which are not yet finished—the Directors consider the result of the year's working satisfactory. It is expected that the whole of the important extensions now in progress will at an early date be available for supplying the increasing demand for gas.

The gross profit for the year was £11,252; and the balance brought forward from 1912 was £1718. Out of this total of £12,970 debenture and other interest has to be deducted of £6956; leaving available for dividend, £6014. Out of this sum it is proposed to pay (less tax) 6 per cent. per annum on £82,500 of preference shares from the date of issue to the end of the year, £502; 2s. 6d. per share on 33,050 ordinary shares for the year, £4131; and carry forward to next year £1381.

THE BLACKBURN GAS STRIKE.

Yesterday was the fortieth day of this unfortunate dispute; and the position then was little different from what it was early in the year. No real progress has been made during the past week towards a settlement, though it was generally anticipated that something tangible would follow Thursday's meeting of the Town Council, which lasted several hours; speeches being made by many of the Liberal and Labour representatives in support of Mr. Wright Robinson's motion that, "in view of the widespread dissatisfaction on the part of the ratepayers at the failure of the Corporation to come to terms with the men now out on strike, a Special Committee be appointed to enter into negotiations with the representatives of the men, and to endeavour to bring the present dispute to an immediate close." This resolution was, however, defeated by 38 votes to 10; and the men did not conceal their chagrin when the figures became known. Mr. J. R. Clynes, M.P., the Lancashire District Secretary of the National Union of Gas Workers' and General Labourers, subsequently addressed a mass meeting of the men, and suggested that the men's case should be submitted to an impartial tribunal.

A telephone message from Blackburn late on Sunday night showed that the illumination of the thoroughfares was well maintained; the supply being practically normal. Improvements are needed in regard to the cleansing and sanitary arrangements; and on this point Mr. Clynes has given certain assurances. He has, our Manchester correspondent adds, also suggested to the Chairman of the Cleansing Committee that he (the Chairman) should take a secret vote of the strikers, and, if the voting showed a third in favour of returning to work, he would endeavour to persuade them to do so on the terms offered by the Corporation. Last week one of the leading journals in the district expressed the view that "the loss of wages in the homes of workers is an appalling and crippling thing"—a sentiment re-echoed in the news that "cotton operatives are receiving 25 per cent. less in wages week by week while the strike lasts than in the ordinary times. The trade of the town is largely reduced to stagnation."

The attitude of the Corporation is unchanged; but if the difficulty of the men "surrendering" on the Corporation terms could be overcome, it is felt that they would speedily return to their duties. The difficulty which presents itself is that the men will not admit defeat,

A Water-Works Arbitration Inquiry.—Mr. F. Bergin, of Dublin, has held an arbitration inquiry at Carrick-on-Suir, relative to the case of Messrs. Martin and Co., Contractors for the Carrick-on-Suir water scheme, against the local Urban Council, as to the withholding by the latter of £1000 because of the Engineer refusing to certify the completion of the work; the service reservoir being alleged to have cracks, with leakage resulting. The Contractors held that the cracks were due to their having to build the floor of the reservoir on a foundation of quarry *débris*. They also claimed for extras. The Council claimed against the Contractors for alleged unsatisfactory filling-in of the pipe-trenches, and for delay. Mr. Bergin promised to make his award as soon as possible.

OLDBURY GAS UNDERTAKING.

Local Government Auditor and the Condition of the Accounts.

At the Meeting of the Oldbury District Council last Friday, the CLERK (Mr. S. Vernon) read a report received from Mr. J. A. Cole. the District Auditor of the Local Government Board, with regard to the audit of the accounts of the gas undertaking for the past year.

It appears that at the opening of the audit some difficulty was caused owing to the accounts not being properly balanced. Some explanation was given by the Manager (Mr. A. Cooke), the accounts were balanced, and the audit closed. In the course of his report, the Auditor said he could not insist too strongly upon the necessity for the books being kept more up-to-date. He found many instances in which they had not been posted and made up when they should have been; and this led to errors which took a considerable time to find owing to the transactions having taken place at a date long past. The rental showed gross arrears on March 31, 1913, of £402 14s. 1d., more than £160 of which represented amounts brought forward from previous years. It was difficult to see why so large a sum should have been allowed to remain uncollected. He suggested that in future a detailed list of arrears should be submitted to the Council, and that their instructions should be taken by the Manager as to how the various cases were to be dealt with. The system of collection from the prepayment meters seemed open to objection; and it appeared desirable that some system should be adopted which would provide for independent readings of the meters apart from the collection of the cash. In the slot-meter account a sum of £271 8s. 4d. was shown as being in arrear at the end of the financial year. This was made up of various amounts which had been lost on the slot-meter collections during a period of about eight years. As it was impossible to deal with these items, the Auditor said it was for the Council to consider whether it was not desirable to write them off as irrecoverable. From observations made during the audit, Mr. Cole said it appeared very necessary that the gas accounts should be brought into an up-to-date condition, and a closer check exercised on them in future.

The Gas Committee reported that the matters dealt with by the auditor would be discussed and finally arranged as soon as the Manager was well enough to attend the Committee. They were pleased to learn that Mr. Cooke's condition was now improving.

Mr. J. WORTLEY characterized the report as a scandalous one.

The CHAIRMAN (Mr. H. Jeffries) said it was only fair to have Mr. Cooke present before any criticism was offered. He therefore suggested that the Council should defer until then what they had to say.

This suggestion was ultimately adopted.

CO-PARTNERSHIP SCHEME AT REDHILL.

Another name is being added to the growing list of co-partnership undertakings by the adoption by the Directors of the Redhill Gas Company of a scheme drawn up by Mr. W. H. Bennett, the Engineer and Manager. A meeting of the employees is to be held to-day, when the rules will be explained. Meanwhile the following particulars have been circulated, signed by the Chairman (Mr. G. R. Hunt).

The Directors have resolved to offer to all their employees the following co-partnership scheme. They have two objects of equal importance in view: (1) To give their officers, staff, and workmen an inducement beyond their salaries and wages to take an interest in their work, and in the welfare of the Company. (2) To give them an opportunity of becoming stockholders in the Company, and thus, by being owners of property, to permanently improve their position in life. The Company works under what is known as the sliding-scale, which permits the payment of a small increase in dividend to the stockholders for every reduction of 1d. per 1000 cubic feet in the price of gas below the standard price. The sliding-scale, therefore, makes it to the interest of the Company to do its best for the consumers. The Directors propose to extend the same principle to the employees, by giving them a certain percentage on their salaries and wages for every reduction of 1d. per 1000 cubic feet below a definite price.

The co-partnership bonus will be at the rate of ½ per cent. on salaries and wages for each 1d. in the price of gas below 4s., down to 3s. 2d.; and below that, ¾ per cent. will be given for each 1d. At present the price of gas in Redhill is 3s. 6d.; and therefore the bonus will be 3 per cent. until the price of gas is reduced or raised.

The co-partnership bonus will be calculated annually up to June 30 on the salary or wages earned (excluding overtime); and those employees who may be employed on piecework will have their bonuses calculated on the amount they would have earned at their ordinary rate of wages, in the regular working hours.

The Directors wish all their employees to become stockholders, or partners, in the Company. They have decided, therefore, to pay the annual bonus for the first five years entirely in stock. After the co-partner has five annual bonuses to his credit, one half will be paid to him in the stock of the Company and the other half will be put to his credit in a separate account, to accumulate at interest; and this portion may be withdrawn, but only with the joint consent of the Manager and the Secretary of the Company, and upon giving special and satisfactory reason for so doing.

The offer is made to every officer, member of the staff, and workman of the Company in regular employment. A condition of acceptance is the employee's willingness to sign an agreement. The agreement binds the Company to find work for the employee for a definite period, and the employee undertakes to obey orders. There is, however, a proviso at the bottom of the agreement to enable any man who has an opportunity of improving his position, to leave at any time at a week's notice, with the consent of the Manager—which will always be given, if he can be spared without injury to the Company. Every man at the start may have an agreement; but afterwards those who are indifferent or careless about their work, are wasteful with materials, or show no

interest in the Company, will not have their agreements renewed till they do better.

Although the adoption of co-partnership was decided upon by the Directors as late as last month, they will on June 30 next credit each co-partner with a full year's bonus, if he has been in their regular employment since July 1, 1913.

The Directors believe that, with a body of careful, thrifty employees, taking interest in the progress and prosperity of the Company, they will be enabled to make continued reductions in the price of gas, to the lasting benefit of the consumers, the stockholders, and the co-partners themselves.

ASSESSMENT OF SCOTTISH GAS-WORKS.

There seems to be no longer any danger of a change in the valuation laws of Scotland in so far as gas and water works are concerned—at least, from the quarter from which the proposal lately emanated.

Some time ago the New Monkland Parish Council, who have for several years had occasion to grumble at the valuation of the Airdrie Corporation Gas-Works, as fixed by that body themselves—finding they could get no redress except through the expensive process of an appeal to the Court of Session—hit upon the idea of asking the newly-formed Parish Councils Association for Scotland to take up the matter at their annual gathering in Edinburgh; and the Council appointed delegates to promulgate the idea of getting the law so altered that they could have corporation gas-works in future valued by the Sheriff of the county.

When the matter came up at the Association's meeting the other day, the Secretary submitted a report regarding the whole matter. It was learned from Mr. Jackson, His Majesty's Assessor of Railways and Canals (the alternative Assessor mentioned in the Act of Parliament), that at present he undertook the valuation of a number of public undertakings, such as water-works, gas-works, &c.; but that these were undertaken by him at the request of the authorities concerned—viz., the county or burgh council, which request must be intimated to him prior to Nov. 15 each year. Parish councils had, in Mr. Jackson's opinion, no *locus* in preferring the request (either to him or to the local authorities) to have such valuations transferred to the Assessor of Railways and Canals; and in his opinion, should parish councils be earnest in their desire to have such work undertaken by him, it would be necessary to have parliamentary power to compel this to be done. The Parish Councils Association, however, decided to go no further in the matter.

Curiously enough, however, simultaneously with this result, comes the announcement by the Airdrie Corporation Gas Committee that in future, in order to avoid further friction with the Parish Council as one of the rating bodies of the district, they desire to petition the Sheriff to appoint the Assessor of Railways and Canals to fix in future the valuation of the burgh gas-works in accordance with the Lands Valuation Act. The Parish Council wanted the Sheriff himself to do the valuation; but it seems that this would be incompetent, and he can only nominate as Assessor the Railways and Canals official, as mentioned in the Act.

LEEDS AND DONCASTER WATER SCHEME.

Rejection on a Poll.

The poll which was decided upon in connection with the clauses of the Leeds Corporation Bill which provide for the supplying of Doncaster with water, has been taken; and the scheme has been rejected. Thus the scheme is for the moment dead - but only for the moment; the vote not having been of a decisive nature. Alderman Willey, the Chairman of the Water-Works Committee, has described the poll as an "unutterable farce;" and Alderman Wilson, the Chairman of the Finance and Parliamentary Committee, considers that the vote is not of such a character that the Corporation would be justified in dropping the scheme. A new Bill will therefore be drafted as soon as possible, and in due course submitted to the ratepayers.

Out of a total of 98,677 eligible ratepayers, 9875 voted—the numbers being: Against the scheme, 5414; for the scheme, 4446; majority against, 968. In some quarters it is believed that, while the supporters of the scheme were apathetic, many of the Corporation workpeople lately on strike have seized the opportunity to upset the scheme, not from conviction, but in a spirit of revenge, because of the firm stand against them made by the authorities and the citizens.

Manchester and Failsworth Amalgamation Scheme.—As the result of several interviews between the Manchester Corporation Parliamentary Sub-Committee and the Failsworth Urban District Council Amalgamation Sub-Committee, terms of amalgamation between Manchester and Failsworth have been provisionally agreed upon. One of the points of agreement is that the Manchester Corporation are to endeavour within five years to effect a transfer of the gas and water supply of the district, and are afterwards to maintain a sufficient supply at the price, and on the conditions, prevailing in the city.

Longwood Gas Company.—The Directors will report at the annual general meeting of stockholders on Thursday next week that the capital expenditure last year was £475—mainly for new meters and heating appliances. The sales of gas during 1913 increased by 3 per cent., or 3,739,300 cubic feet—now totalling to 123 millions. A dividend on the consolidated ordinary stock is recommended, making, with the interim dividend paid for the first half of the year, £5 17s. 6d. per cent. per annum. An extraordinary general meeting will follow, when the Bill which has been deposited in Parliament to effect the amalgamation of the Longwood and Slaithwaite Gas Companies (a procedure which was approved at a special general meeting last November) will be submitted, to comply with the Standing Orders of Parliament.

BIRKENHEAD WATER SCHEME.

Estimates Exceeded.

Much interest was evinced at a meeting of the Birkenhead Town Council last week, when there came up for consideration a report of the Water Committee showing that the parliamentary estimate of expenditure for the completion of the Alwen water scheme had been largely exceeded.

Alderman Henry Bloor, who has been Chairman of the Water Committee since the commencement of the scheme, presented the minutes of the Committee and moved that immediate steps should be taken for amending the Act so as to allow of more capital being raised to enable the Alwen portion of the scheme to be completed. In explaining the circumstances of the excess, he said the original estimate of the cost of the Alwen supply was £738,245, whereas the present gross estimate of what would be the actual cost was £970,650, making a gross total increase of £232,415. From this had to be deducted a saving of £34,650 in substituting mechanical filters instead of the sand filters provided for in the original estimate. This made a net total increase of £197,765. By adding this £197,765 to the original estimate of £738,245, they got £936,010 as the total estimated cost of the undertaking. He gave full details and figures, which showed that more than one-half the increase was in connection with estimates of the cost of the 42 miles of pipe-line from Alwen to Birkenhead—this depending mainly on the rise in cost of material and labour. Emphasis was laid on the fact that the parliamentary estimates were made by Mr. Deacon in a period of trade and labour depression, and were, of course, based upon the prices then ruling; whereas the Council were being called on to carry out the work at the top of a trade boom. By their Act, they were debarred from borrowing more than £800,000 before the contract for the Brenig or second portion of the scheme was let. If they were successful in getting this limitation removed, they would, if desired, be prepared to have the further borrowing power limited to £200,000. On the other hand, if the limit remained, the work would have to be stopped, with consequences too serious to contemplate. He expressed his deep grief at having to make this announcement, but added that he had the satisfaction and consolation of knowing that the increased expenditure was not due to any act of omission or commission by his Committee, their Engineers, or Contractors, but had entirely been brought about by circumstances over which none of them, individually or collectively, had any control.

The minutes were confirmed unanimously.

COLNE VALLEY WATER COMPANY.

Half-Yearly Meeting.

The Half-Yearly General Meeting of this Company was held at the Charing Cross Hotel last Tuesday—Mr. C. E. KEYSER (the Chairman) presiding.

The SECRETARY AND GENERAL MANAGER (Mr. C. P. Sinclair) having read the notice convening the meeting, the report and accounts for the six months ended Dec. 31 last were presented.

The CHAIRMAN, in moving the adoption of the report, said the total amount of water-rates for the half year was £29,341, or £2218 in excess of the corresponding period of 1912. This satisfactory result was due to the increasing trade use of water in various parts of the Company's district, and to the filling-up of most of the empty houses. The number of new supplies was 366, estimated to yield an annual water-rental of £1000; while for the entire year the number was 776, and the annual water-rental £2158. The increase in the cost of maintenance and management as compared with the corresponding period of 1912 amounted to £812, over one-fourth of which was accounted for by rates and taxes. This item was an ever-increasing one, as the rating authorities became year by year more exacting. So much so that it was necessary to exercise the greatest vigilance in guarding the Company against over-assessment in any of the parishes. The Company must be fairly assessed; but they must fight where circumstances warranted it. Dr. Thresh and Dr. Beale had reported that the water supplied by the Company was in all respects excellent, and "an ideal water for the purposes of a public supply." The profit for the half year amounted to £19,465, of which £2000 had been transferred to the contingency fund account, which had a credit balance of £10,147 to date. After paying interest on debenture and preference stocks, and declaring the full statutory dividends on the various classes of ordinary stock, in addition to 1 per cent. (actual) on account of back-dividends on the "A," "B," and "C," stocks, there was a balance of £9131, or an increase of £1973 over the amount carried forward for the corresponding period of 1912.

The VICE-CHAIRMAN (Mr. A. Helsham-Jones) seconded the motion; and it was carried unanimously.

The retiring Directors and Auditor having been re-elected,

Mr. W. B. BRYAN proposed a vote of thanks to the Directors and officers, for the way in which they had attended to the affairs of the Company in the past half year. He had previously stated that he had had an opportunity of going over the works during the six months, and everything he saw redounded to the credit of the Directors and officers.

Mr F. J. BANCROFT, seconding the motion, said that, as one connected with a neighbouring Company (the Barnet), he could assure the shareholders that the results presented by the Chairman reflected great credit on the Directors and their staff.

The CHAIRMAN, in acknowledging the vote, paid a tribute to the Secretary for the work he had done in connection with the Company's assessments, and also with an attempt on the part of the Watford Urban District Council to enlarge their boundaries. With regard to the rest of the staff, he said Mr. Blackburn (the Resident Engineer) and the other members were all animated with the one wish to make the Company a success.

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

The Waverley Association of Gas Managers have now inaugurated their Commercial Section, and propose to send out monthly reply post cards for particulars as to stocks and prices, and only those members who return the post cards, duly filled up, will receive the next month's residuals list. For obvious reasons the names of the towns will not appear on the lists, but will be represented by numbers. With the first residuals list, a private sheet will be sent bearing the names and numbers of the respective towns. The Secretary, Mr. Cuthbert Hamilton, of Loanhead, states that the Committee hope that the members will give their whole-hearted support to what is believed will be of much assistance to the respective undertakings which the members have under their charge. The items on the post card to be filled up by the members are as follows: "Stock. For local sales, price per ton in yard. For outside delivery, price per ton f.o.r. Price per 100 gallons of tar and liquor, 4° and 5° Twaddel. Price per 100 gallons of tar alone Price per ton of sulphate of ammonia, net and naked. Other residuals." Circulation among the members of the Association of the current prices of the residuals should certainly help to prevent the cutting of prices between works in the same neighbourhood; and this will be for the general benefit of the companies represented by the various members.

The Pitlochry Special District Committee considered a report on the proposed acquisition of the gas-works. The report stated that the capital of the Company was £6500, and that the present value of the establishment and plant was £6739. It appears that for many years the dividend has been 5 per cent., while the net profit for the last financial year was £633. If the local authority can purchase the shares at par, they will have to provide a further sum of about £1000 for the cost of transfer, renewals, &c. This would call for an annual payment of £450; so that the whole sum should be repaid in thirty years. On the figures for the past year, this would leave a balance of profit of £183, which should provide ample for upkeep and depreciation.

A letter addressed to the Secretary for Scotland by five members of the Greenock Corporation, in which they indicate their opposition to the power sought by the Corporation generally to borrow £50.000 for gas-works improvements, has been forwarded to the Corporation by the Scottish Secretary. At a special meeting, the latter body considered the minute of the Gas Committee, who had approved of a draft reply suggesting that the Secretary for Scotland should now receive a deputation from the Corporation, so that the position might be fully explained to him. This minute was approved.

The remarks regarding the electric lighting in some of the smaller towns in the North of Scotland made in this column a week or two ago, have been reproduced in a Banffshire paper. It is very satisfactory to find the public Press giving both sides of a question of this kind, as it so frequently happens that the electricians or their spokesmen are allowed full licence to advertise their statements, while the poor gas man is prevented the chance of a reply—his commodity having that familiarity which breeds contempt. It will be interesting to watch the next move of the other side.

The Inverkeithing Town Council have decided, upon the recommendation of Bailie Wyllie, to engage the services of Mr. W. R. Herring to advise them upon the price which they might offer to the Gas Company for the acquisition of their undertaking. Meantime, a Committee was appointed to continue the negotiations with the Directors.

Mr. A. Waddell has reported to the Corporation of Dunfermline upon the necessity of considerably augmenting the plant at the gas-works. This is rendered necessary on account of the increasing use of gas for lighting, cooking, fires, and other heating and labour-saving appliances for domestic and industrial purposes. The Naval Base is adding to the population, and there will be an increased prospect of more people coming into the district as the works proceed; while the building of houses upon the land, which is at present being town-planned, will demand a further increase in the quantity of gas to be made. It has been decided to proceed with a scheme which is estimated to increase the annual production by at least 3 million cubic feet. The cost will ultimately be about £8000; but it will proceed slowly as the demands increase.

Kirkcaldy is still discussing the question of the removal of the gas-works from the shore to some other place, so as to make a start with the new esplanade. Certainly the gas-works would not be a beauty spot if this scheme ever comes to practical politics. But the difference between carrying out the removal to an entirely new site and enlarging the present works, is some £36,000. This is a big price to pay for an esplanade, which will probably bring no return to the town, and may not be used by the townsfolk, who have come to look upon the foreshore as anything but a salubrious spot, and certainly not a place to take one's walks abroad upon. The Dysart Town Council have been discussing with the Gas Company as to a joint petition against the Kirkcaldy Provisional Order; but the Company have declined. The Clerk, however, intimated that certain proposed additions to the Order would to a great extent meet the objections of the Dysart Town Council. A question was asked as to the receipt of the balance-sheets of the Dysart Gas Company for the last ten years, as asked for by the Town Clerk. The Company have replied that they object to giving these to the Council until they have adopted the Burghs Gas Supply (Scotland) Act.

There was a long discussion at the meeting of the Burntisland Town Council as to the necessity of the transactions of the Gas Committee being reported to and confirmed by the Town Council as a body. The Town Clerks have reported upon this motion, which was made by Councillor Kirk; and they point out that there is no necessity for such a report being made under the constitution of the Committee. The Town Council could, however, if they wished, put an end to the present state of matters, and continue the present Committee with all its powers. The Provost stated that the motion had been declared to be incompetent by the Town Clerks; and he therefore ruled it out of order.

The Sanquhar Town Council have decided upon a very wise proceeding. They have instructed a local architect to prepare a plan of all the mains in the town. In how few of the smaller towns is such a plan to be found? Possibly the manager has some few notes of the position, but generally these are engraved only on the tablets of his memory, and, should he make a move to another district, he takes these engravings with him, and the new manager loses all record, and whenever he wants to connect a new service has to trench all across the road before he finds the main.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

During the past week pitch has found buyers at 39s. 6d. to 40s. net per ton. Makers have large inquiries for creosote for export, and a good price for this product is assured for a long time ahead; the present value being 3⅝d. to 3¾d. net per gallon in bulk f.a.s. London. Benzol is all required for local use, and still realizes 1s. 2d. to 1s. 2½d. net and naked per gallon at makers' works. Carbolic acid, solvent naphtha, and toluol are unaltered. Anthracene 45-50 per cent. remains at 2d. net per unit. Freed tar for the roads continues in large demand, and the outlook is that larger quantities will be required for next season than for the last.

The market for sulphate of ammonia is steady with an increasing inquiry from buyers, who are paying £11 17s. 6d. for 25 per cent. quality net and naked at makers' works. The British shipments of sulphate for last month were 33,992 tons, as compared with 31,788 tons in January, 1913. According to the official German statistics, the total exports of sulphate from Germany for the year 1913 were 75,868 tons, compared with 57,268 tons for the year 1912.

Tar and Tar Products in the Provinces.

The average values during the week were: Tar, 26s. 9d. to 30s. 9d. Pitch, east coast, 38s. 6d. to 39s. 6d.; west coast, Manchester, 38s. to 38s. 6d.; Liverpool, 39s. to 39s 6d.; Clyde, 38s. 6d. to 39s. 6d. Benzol, 90 per cent., naked, North, 11½d. to 1s.; 50 90 per cent., naked, North, 11d. Toluol, naked, North, 10⅜d. to 11d. Crude naphtha, in bulk, North, 5d. to 5¼d. Solvent naphtha, naked, North, 9¼d. to 9⅜d. f.o.b. Heavy naphtha, naked, North. 9d. to 9¼d. f.o.b. Creosote, in bulk, North, 3d. to 3¼d. Heavy oils, in bulk, 3⅝d. to 4d. Carbolic acid, casks included, 60 per cent., prompt, east and west coasts, 1s. 0½d. to 1s. 1d Naphthalene, £4 10s. to £10; salts, 55s. to 60s., bags included. Anthracene, "A" quality, 1½d. to 1¾d.; "B," nominally, ¾d. per unit, packages included and delivered.

Sulphate of Ammonia Prices in the Provinces.

LIVERPOOL, *Feb.* 7.

Throughout the week a better demand has been experienced for early deliveries, and values have hardened perceptibly at all ports. The inquiry from abroad has not been large, but dealers in this country have competed keenly for all available supplies. The quotations at the close are £12 7s. 6d. per ton f.o.b. Hull, £12 8s. 9d. per ton f.o.b. Liverpool, and £12 10s. per ton f.o.b. Leith. Notwithstanding the improvement in the price for February sulphate, the forward position has shown little animation, and no first-hand transactions have been reported.

Nitrate of Soda.

There is still no change in the market for this material, holders maintaining spot quotations at 10s. 4½d. per cwt. for ordinary and 10s. 7½d. for refined quality.

From another source it is reported that the market for sulphate remains fairly steady, but prices have not improved at all. The tender parcels have not fetched very high figures, which looks as though buyers are not particularly keen. Orders from abroad are still very scarce. Outside London, makes are quoted at £11 10s.; Hull, £12 5s.; Leith, £12 7s. 6d.; Liverpool, £12 5s. to £12 6s. 3d.; Middlesbrough, £12 5s.

Wandsworth, Wimbledon, and Epsom Gas Company.—At next Tuesday's meeting of this Company the Directors will submit accounts showing that for the second half of 1913 there was a profit of £28,153; and after providing for interest on debentures, &c., there will be (including the amount brought forward from the first half of the year) a sum of £37,253 available for dividends on the ordinary stock. These are recommended at the "statutory rates" per cent. per annum as follows; Wandsworth "A" stock, £8 7s. 6d.; Wandsworth "B" stock, £6 17s. 6d.; Wandsworth "C" stock, £5 17s. 3d.; Wimbledon stock, £6 2s. 6d.; Epsom stock, £6 12s. 6d.; new ordinary stock, £5 17s. 3d. The sale of gas during the six months showed an increase of 8·05 per cent. over the corresponding period of 1912.

Gas-Poisoning Fatality in Belfast.—At an inquest on the body of Albert E. Stoups, who had resided in a model lodging house in Belfast, and who died in hospital from gas poisoning, John Watterson, a night attendant in the house, said that on Monday, the 2nd inst., he tried to arouse deceased for his work; but the door of the bedroom was locked, and he had to climb through a window. He noticed that the gas was turned on, but was not lighted, and that an empty matchbox lay on the floor. He turned off the gas, and had Stoups removed to hospital. In witness's opinion, the man turned on the gas; and then, finding he had no matches with which to light it, went to bed, forgetting to turn it off again. The Coroner suggested that the whole question of the gas supply in the institution should be considered by the Management Committee; and it was promised that this would be done. Dr. Jefferson said death was due to coal-gas poisoning. The Jury returned a verdict accordingly, adding that they attached no blame to the attendant.

COAL TRADE REPORTS.

Northern Coal Trade.

There is a steady demand for coal, and, with steamers plentiful, the shipments have been good. Prices are on the whole maintained. In steam coals, best Northumbrians are from 13s. 7d. to 14s. per ton f.o.b. for early delivery; second-class steams are about 11s. 10d. per ton; and steam smalls are plentiful at 6s. to 6s. 9d. Production is full generally, and is well taken up. In the gas-coal trade the best classes are not so plentiful as are seconds. Best Durhams are quoted about 13s. 6d. to 13s. 9d. per ton f.o.b. for prompt delivery, with second-class gas coals about 12s. 3d. per ton. "Wear specials" are from 13s. 9d. to 14s. per ton. f.o.b. As to contracts, those for Turin are believed to be fixed at prices from 18s. 6d. to 19s. 6d. per ton, delivered at Savona, according to the quality; but these prices are not official. For Helsingfors, some 20,000 tons are believed to have been contracted for, at a price expected to leave from 13s. 6d. to 13s. 9d. per ton f.o.b. Esbjerg is also asking for tenders for its gas-coal supply; and it is believed that there is some inquiry on the part of one of the Metropolitan Companies. One factor tending to the fixing of contracts now is the low rate of freights at present. Coke is steady generally. Gas coke is firmer, with good makes at 13s. 3d. to 13s. 10½d. per ton f.o.b. in the Tyne.

Value of Gas-Grillers in Children's Homes.

At a meeting of the Southwark Board of Guardians on Friday, a report was considered from the Children's Homes Visiting Committee stating they had had under consideration the question of installing some gas-grillers in the homes. At the present time it was necessary for the house mothers to keep their kitcheners burning during the whole of the day throughout the summer months, in order to cook the food for the children, and the Committee were of opinion that the installation of some small gas appliances would effect considerable economy in the coal consumed, as well as prove a great convenience to the mothers and children during the hot weather. The Committee had received an estimate from the South Metropolitan Gas Company for supplying and fixing six gas-grillers, which could be placed on the kitcheners, and the Committee recommended that an order should be issued accordingly. The whole of the gas required could be taken through one meter. The Board adopted the Committee's recommendation.

Wholesale Gas Suffocation reported from Moscow.—Saturday's "Matin" (Paris) published a despatch from Moscow stating that forty-one persons were found to have been suffocated by gas in an insurance office. Most of them were dead when the porter entered the room; while endeavours to restore others to consciousness proved unsuccessful in the majority of cases. The accident is attributed to leakage from a gas-pipe.

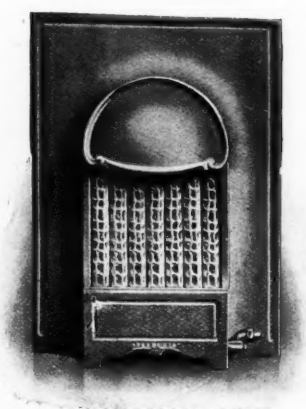
Sunbury and the Brentford Gas Bill.

The Sunbury Urban District Council considered at their last meeting a report by the Highway Committee on the Brentford Gas Bill. The Committee said it was felt by one or two members that the price of gas mentioned in the Bill as regarded Sunbury should be reduced to the same as that charged at Brentford as soon as the Sunbury Company was taken over. The Committee ultimately decided to recommend the Council to apply for a reduction to 3s. per 1000 cubic feet from the taking-over of the Company, with a yearly reduction of 1d. until the price at Sunbury became the same as at Brentford—the same price to apply to all classes of meters. Having regard to the price paid at Brentford for the public lamps and the difference in the hours of lighting, the Committee recommended the Council to apply for a reduction in the price to £2 5s. per lamp per annum, to include the cost of lighting and extinguishing, the provision of lantern fittings, painting, and all incidentals. Further, that the Council object to the clause by which the Brentford Gas Company sought power to apply for a Provisional Order to supply electricity. The Committee considered that there should be a clause inserted in the Bill empowering the Council to purchase at any time on reasonable terms so much of the undertaking as was within the parish. The Committee had asked the Engineer of the Brentford Gas Company to meet them; and the Clerk had been instructed to communicate with the Company explaining what were their objections. The Committee afterwards had the subject before them again, when it appeared that the Brentford Gas Company were not willing to meet their suggestions; and the Committee therefore recommended the Council to petition against the Bill with the object of obtaining proper concessions. After some discussion, the report was adopted, with the exception of the reference to a purchase clause.

Fazakerley (Liverpool) Gas-Works Accounts.—The Fazakerley gas accounts, presented to the Liverpool City Council on Wednesday last show the income on the past year's working to have been £4406, and the working expenses £3316; leaving a balance of £1150, which has been applied to interest and sinking fund contributions. The estimated expenditure for the current year is £5181.

Reduction in Price at Exeter.—The Directors of the Exeter Gas Company announce a reduction in the price of gas from 2s. 6d. to 2s. 4d. per 1000 cubic feet, to take effect as from the reading of the indexes at Christmas last. The reduction from 2s. 6d. to 2s. 4d. is, of course, for general purposes. For gas-engines, the reductions are as follows: Under 50,000 cubic feet per half year, from 2s. 5d. to 2s. 2d. per 1000 cubic feet; over 50,000 and under 250,000 cubic feet, from 2s. 2d. to 2s.; and over 250,000 cubic feet, from 1s. 11d. to 1s. 10d. These prices will still be subject to the usual discounts for large quantities, provided the accounts are paid on or before Feb. 28 and Aug. 31 in each half year respectively, as follows: From ¼ to 1 million cubic feet per half year, 5 per cent.; from 1 to 2½ million feet, 7½ per cent.; and over 2½ million feet, 10 per cent.

THE "MAIN" AIM.



Controversy has been rife during the past year regarding the hygienic efficiencies of the various makes of Gas Fires.

The "Main" Aim is to satisfy the most cautious, you need have no fear with our D.S.O. Gas Fires.

The "D.S.O." Fires effect the complete discharge of the products of combustion through the flue vent without the aid of any flue attachment.

Will pass any test.

R. & A. MAIN, LIMITED.

WORKS: Gothic Works, EDMONTON, N.; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.

SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.; 136, Renfield Street, GLASGOW; 56, Broad Street, BIRMINGHAM; 83, Old Market Street, BRISTOL; 13, Whitworth Street West, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

Newport (Mon.) Gas Company.

Proposing the adoption of the report and accounts at the half-yearly meeting of the Newport (Mon.) Gas Company, Mr. T. G. Cartwright, the Deputy-Chairman, who presided, said that, in spite of the difficulties of the past six months, they had earned their dividend. In the last half year there had been a small decrease in the sales of gas as compared with the corresponding period of 1912; but on the whole of the year there was an increase of about 1 per cent. During the period under review, there had been put in 199 new services—129 of them for prepayment meters. The total number of prepayment meters now was 11,223, and of ordinary meters 4505. He referred to the success of the recent National Gas Exhibition, and stated that the Company arranged for several of their staff to go and have a look at it. No doubt the experience they had gained would be of great advantage to them and to the Company. Referring to the prospective industrial growth of Newport, Mr. Cooke asked whether the works at Crindau were sufficiently large to provide for the probable enhanced consumption, or whether it would be advisable, before the value of land went up very much, to acquire a site for auxiliary works. In reply, the Chairman said the Company were in a position to go on for some considerable time with their existing resources. After the report had been adopted, a dividend at the rate of 5 per cent. per annum on the consolidated stock was declared, and the services of the Chairman, Directors, Engineer (Alderman Thomas Canning), Secretary (Mr. T. H. Hazell), and other officers, were acknowledged.

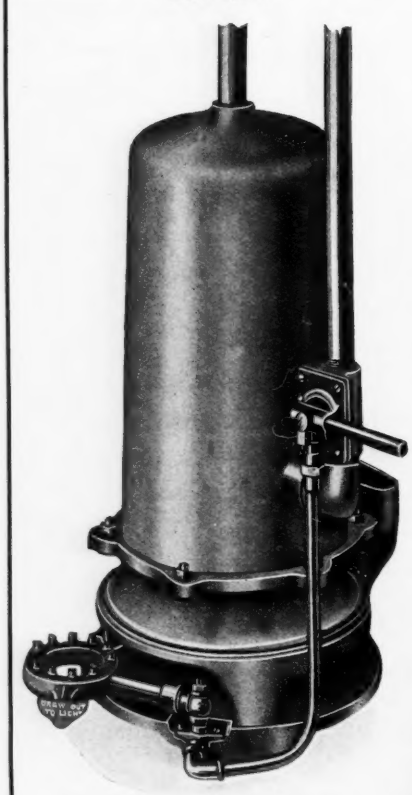
Sunderland and South Shields Water Company.—The revenue last year was £112,091 (an increase over the previous year), enabling the payment of dividends—including the interim dividends paid last September—of 9 per cent. on the ordinary and preference stocks, £6 6s. per cent. on the 7 per cent. additional capital stock, and 4½ per cent. on the 5 per cent. additional capital stock. Last year 4311 yards of new mains were laid, making 389 miles in all.

Dorchester Gas Company.—The shareholders of this Company hold to-day their seventy-first half-yearly meeting. Working with a paid-up capital of £26,000, and with £4500 of borrowed money, the accounts show an amount of £1304 carried to the profit and loss account—receipts £5797, and expenditure £4493. With the balance brought forward there is £2987 available for dividends of 10 and 6 per cent. for the second half of last year. The Directors report that the sale of gas has been maintained, "notwithstanding the mildness of the weather prevailing up to Christmas and the introduction of the electric light early in November by the County of Dorset Electric Supply Company." The Board say they are fully satisfied with the results of the new showrooms and offices, as the "consumers seem to appreciate the facilities afforded for inspection and purchase of the latest developments in gas apparatus."

Co-Partnership at Cambridge.

The annual meeting of the Cambridge University and Town Gaslight Company was held last Tuesday, when the Chairman (Mr. E. H. Parker) said the report disclosed another successful half-year's trading. Notwithstanding the mild autumn and winter, the output of gas showed a satisfactory increase of 9 million cubic feet over the corresponding period of last year; and in spite of a fall of nearly £900 in the receipts from residual products, dividends at the maximum rates had been comfortably earned. In former years, dark, foggy days were the principal factors governing the demand for gas; but now a cold day had far more effect. This was due to the extraordinary popularity of gas-fires. There were now some 7000 gas-cookers in Cambridge. Coke had not maintained the high price which prevailed last year; and there were various causes for the drop. The principal ones were the mild weather conditions and the fact that, owing to the high price of oil, there had been a considerable decrease in the manufacture of carburetted water gas. It was rather surprising that coke was not more popular as a household fuel; and the Directors were at the present time considering what steps should be taken to popularize its use. Ordinary consumers had increased by 175, and slot-meter consumers by 194—making a total of 7282 ordinary and 5850 prepayment meter consumers. He thought on the whole the co-partnership scheme was proving successful. It was started with the object of bettering the social position of their workmen; and many of them now had over £20 invested in the Company's "C" stock, and were drawing their 5 per cent. dividend half yearly. Most of the workmen showed the true co-partnership spirit, were zealous in the interests of the Company, industrious and intelligent in their work, saving material and time, and preventing mistakes. But there were others who did not show any increased interest in the Company's welfare; and in a few cases it had been found necessary to debar workmen from participating in the bonus, which carried with it an agreement for regular employment with the Company—an important point for the men to consider. He hoped as time went on every co-partner would feel that the interests of the Company were in reality his own. The report was adopted.

Brentford Gas Company's Land-Purchase Scheme.—Strong objection is, it is reported, evinced by some of the residents in the district to the proposal of the Brentford Gas Company to purchase from the Duke of Devonshire for gas-works purposes about 80 acres of land at Chiswick known as the "Duke's Meadows." A small Committee has been formed to oppose the scheme, and to obtain petitions to a ratepayers' petition against the Bill. A suggestion that the land should be acquired by the local authority and converted into playing fields for the use of the public, has not so far been supported by the Chiswick Urban District Council, on the score of expense. Thus the opposition has not made serious headway. The Council have, however, lodged a petition against the Bill, so as to protect their interests if necessary.



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Cardiff Gas Company.

In moving the adoption of the report and statement of accounts at the annual meeting of the Cardiff Gas Company last Wednesday, the Chairman (Colonel H. Oakden Fisher, J.P.) said that, in consequence of materials going up, the cost of manufacturing gas was higher; but while some gas concerns had been compelled to increase their charges to the public, they in Cardiff were more fortunate, and by the exercise of economies and the adoption of new methods had been able to keep down the cost of production. Last year's reduction of 1d. per 1000 cubic feet had been met by the economies referred to. They had had a record year, with an increase of 68 million cubic feet. Their maximum production had not been reached; but they were increasing their retort capacity to meet the growing demand. The use of high-pressure lamps had increased; and the Company were now maintaining 15,000 incandescent mantles. The cost to consumers had never been so low in Cardiff, or in Wales. They were not ready to make an immediate further general reduction in price; but it was proposed to reduce the charge to gas-engine users to 1s. 6d,, and the rate outside the city would come down from 3s. 6d. to 3s. 3d. in March. They intended to cater more for users of gas for industrial purposes. The co-partnership system continued to be satisfactory, and they were on the best of terms with their 347 co-partners. The apprentices and junior clerks were encouraged to attend engineering and book-keeping classes at the Technical Institute, and prizes were offered by the Company. The report and accounts were adopted; the usual dividends at the rates of 4½ per cent. on the preference and 5 per cent. on the ordinary stock were declared; and a vote of thanks was accorded to the Chairman, Directors, General Manager (Mr. George Clarry), Chief Engineer (Mr. H. D. Madden), and staff.

Gas Lighting at Ballymena.—A protracted discussion took place at the last meeting of the Ballymena Urban District Council, as to the recent display given by the Selas Company at the gas-works. It was decided to refer to the Gas Committee the question of introducing this system in a number of the principal streets. The Committee were also requested to consider the application of the gas workers for increased wages and a reduction of working hours.

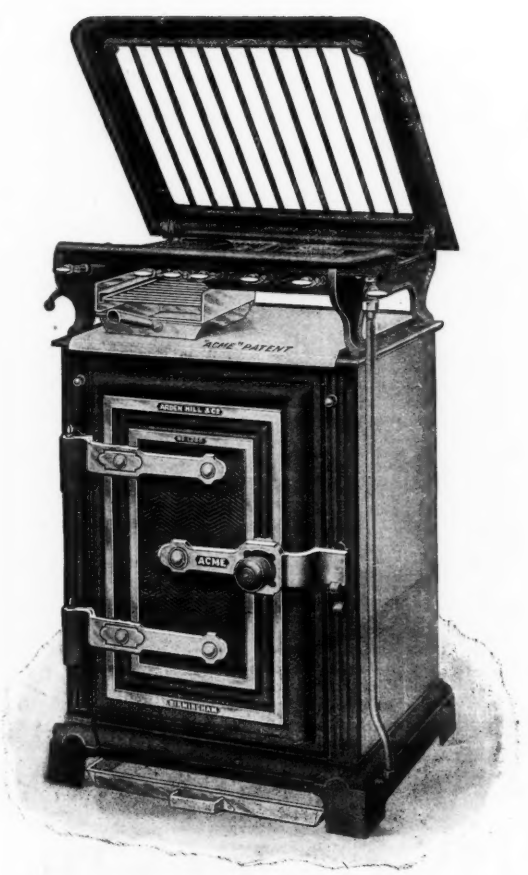
Striking Progress at Newcastle.—The Newcastle-upon-Tyne and Gateshead Gas Company announce in our advertisement columns a sale by tender of £100,000 of new ordinary stock, at a minimum price of par, which, at the present rate of interest, will give a yield of 4½ per cent. per annum. Tenders for £5 of stock and upwards will be receivable up to next Tuesday afternoon, at the chief office of the Company. The increases in the quantity of gas sold by the Company during the last three years have been: 1911, 1·87 per cent.; 1912, 1·72 per cent.; and 1913, 5·9 per cent. Since the introduction of the sliding-scale in 1879, the Company have paid in each year the full statutory dividends authorized by their Acts.

Sales of Stocks and Shares.

At the Mart, Tokenhouse Yard, E.C., last Tuesday, Messrs. A. & W. Richards sold by auction stocks and shares in the Hornsey and Southend Gas Companies and the East Grinstead Gas and Water Company. The last was a new issue by order of the Directors. It consisted of 500 "C" £10 shares, ranking for a maximum dividend of 7 per cent., but entitled, equally with similar shares, to £6 13s. per cent. per annum. They were all sold at £11 to £11 2s. 6d. each. Under instructions from executors, £230 of consolidated stock of the Hornsey Gas Company, ranking for a maximum dividend of 7 per cent., but receiving for more than ten years 9⅓ per cent. per annum, was submitted; and it realized £191 10s. per £100 of stock—the purchaser taking the dividend accruing from July 1, 1913. Some new ordinary 5 per cent. "B" stock of the Southend Gas Company, carrying 5⅓ per cent. per annum, fetched £109 10s. to £110 per £100—the purchaser taking a half-year's dividend; and a small quantity of new ordinary stock, carrying £5 17s. 6d. per cent. per annum, was sold at £115 per £100, with £2 18s. 9d. per £100 dividend. At a sale of gas shares last Thursday, at Exmouth, the Auctioneer (Mr. H. W. Crews) said the record of the Exmouth Gas Company was one of continued progress. Recent enlargements and up-to-date appliances had made the works one of the best in Devonshire. £50 of 4 per cent. debenture stock in the Company was purchased at £49; and other similar lots at £48 10s. and £48 15s. £50 of 5 per cent. first preference stock realized £55, another lot £55 10s. Ten 4½ per cent. first preference shares of £5 each in the Budleigh Salterton Gas Company, Limited, were secured at £48, and other like lots at £46 and £45 10s. Some lots were withdrawn. Lots of £50 of 4 per cent. first mortgage debenture stock of the same Company sold for £42 and £43 2s. 6d.

Opposition to the Liverpool Gas Bill.—Last Wednesday, the Liverpool City Council considered the matter of the proposed Bill to extend the limits of the Liverpool United Gaslight Company, to provide for the conversion of the existing capital, and to change the name of the Company. It was unanimously decided to adopt a formal resolution authorizing the Corporation to oppose the Bill in one or both Houses of Parliament. The Bootle Town Council have also decided to oppose the Bill.

Gas and Electricity Prices at Carlisle.—Notice has been given by Mr. Gibbings that at the meeting of the Carlisle City Council this week he will move that a variation be made in the resolution adopted by the Council at their last meeting relating to the prices of gas and electricity, so as to order that whenever the Gas or Electricity Committee is requested to quote prices other than those already fixed by the Committees concerned for lighting or power to consumers of either gas or electricity, the Engineers (and, if necessary, the Committees) shall confer before any quotation is made, with a view to preventing unnecessary competition and cutting of prices.



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Fatality Caused by Leakage from a Main.

An inquiry was opened on the 27th ult., at the Guardians' Offices, Chelsea, by Mr. C. Luxmoore Drew, in relation to the death of Joseph Neville (73), who was found dead in bed, at 34, Caroline Place, Chelsea, on the previous Friday. Mr. C. Beasley Robinson (Messrs. Monier-Williams, Robinson, and Milroy) appeared on behalf of the Gaslight and Coke Company; Mr. Courtenay, solicitor, represented the relatives. It appeared from the evidence of the son that he called at his father's room on the day named; but, finding the door locked, he burst it open, and immediately detected a very strong odour of gas. His father was lying on the bed partly dressed, and quite dead. There was no gas-pipe, nor were there brackets or fittings of any kind. Florence Platt, the landlady, gave corroborative evidence; adding that she found under the skirting-board, quite near the deceased's head, a large hole from which gas was coming up very strongly. The Gas Company were sent to immediately, and their men opened the road, and called her attention to a leakage of gas from the main in front of the house. Dr. James Edmond Smith stated that he had made a *post mortem* examination of the body, and found the organs fairly normal. He could not find any trace of gas poisoning in the blood, which was dark, and not of a bright cherry colour. He, however, found signs of old pneumonia; and this he thought was the cause of death. In his opinion, it was not in any way connected with the escape of gas. William Campbell Johnston, an employee of the Company, deposed that he had examined the main, and found a fracture. The escaping gas had undoubtedly percolated through the earth, and then passed through the hole which had been referred to into the deceased's room. In answer to Mr. Robinson, witness said the main was in an extremely good condition—practically as good as on the day it was put in. Inspector Turrell having stated that the Company had not received any complaints about an escape of gas in the neighbourhood, the Coroner expressed the opinion that the case should be carried a little farther; and he adjourned the inquiry for a week, in order that the blood might be analyzed for any traces of gas poisoning. On the resumption of the inquiry last Tuesday, Dr. B. Spilsbury, who conducted the second examination, stated that death was due to fatty degeneration, accelerated by gas poisoning. The other doctor had made his examination in artificial light, which was liable to mislead him. A verdict of "Accidental death" was returned.

New Water Board Offices.—The Metropolitan Water Board last week had before them the question of the new central offices to be erected at New River Head, Rosebery Avenue; and it was decided that they should include accommodation for the Clerk's, Accountant's, Solicitor's, and Engineer's departments now at Savoy Court. With the additional departments, it was reckoned that the cost will amount to £90,000. It was agreed that where gas or electric light was provided for resident officers, the allowances should be limited to a fixed amount, to be registered by meter, the officers to pay for all gas and electricity consumed in excess of the amount allowed.

London County Council and the Gaslight and Coke Company's Bill.—At the meeting of the London County Council last Tuesday, it was unanimously resolved to oppose the Bill promoted by the Gaslight and Coke Company, the scope of which has already been indicated in the "JOURNAL."

Reduction in the Price of Gas in Wimbledon and Epsom.—The Wandsworth, Wimbledon, and Epsom District Gas Company announce that the Directors have decided to reduce the price of gas from the end of the present quarter in the Wimbledon district by 1d. per 1000 cubic feet, and in the Epsom district by 1½d. per 1000 cubic feet—bringing it down in the latter place to 2s. 9d., which is 6d. less than it was at the time of the amalgamation.

The Batley Corporation Gas Committee propose to instal high-pressure gas for street lighting, and have visited Leeds and Bradford to study the working of the systems in those cities.

The Horstmann Gear Company, Limited, have received a repeat order for 1000 of their type 3a gas controllers for the Liverpool Corporation—after supplying some 3000 of them in 1913, when they were first put on the market.

A gas-engine explosion on the premises of Messrs. Arnott, of Dublin, occasioned much alarm on the night of the 2nd inst. The man who was in charge of the engine was lifted off his feet by the force of the explosion; and immediately afterwards he was surrounded by flames. The fire which resulted from the explosion was speedily extinguished.

The Godstone Workhouse Lighting Committee, after careful inquiry, are convinced that a very large saving in the gas bill can be made by modernizing the fittings, and by concessions which the Redhill Gas Company offer; and they have therefore not considered any proposal for another illuminant. An economy of at least 50 per cent. in the gas consumption is anticipated; and this in one year will represent more than the total cost of the alterations to be carried out by the Gas Company.

There was a pleasant gathering of the officers and clerical staff of the Brentford Gas Company on the occasion of their second annual dinner, which was recently held at the Clarendon Restaurant, Hammersmith. The Engineer and Manager (Mr. Alex. A. Johnston) presided; and the Secretary (Mr. John T. Croxford) occupied the vice-chair. Mr. Croxford proposed "The Brentford Gas Company," and it was acknowledged by Mr. Reginald J. N. Neville, M.P., the Chairman of the Company. "The Chairman and Directors of the Brentford Gas Company" was given by Mr. Johnston. The toast of "The Officers and Clerical Staff of the Company" was submitted by Mr. William King, and responded to by Mr. W. J. Rapkin. A varied programme of music and recitations was gone through, some of the pieces being contributed by members of the staff.

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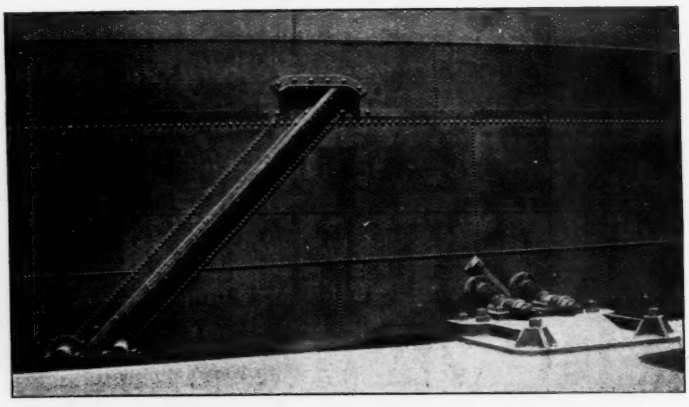

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MANCHESTER.

GAS COMPANIES IN THE STOCK EXCHANGE.

The Stock Exchange has had an interesting—not to say an exciting—week of quick-change kaleidoscopic mutations. In the first half, the extraordinary buoyancy which had characterized the previous week was still in full action, and prices rose like airships. But this sort of thing could not go on for ever; and, in the last half, down they all came again—some of them a bit lower than where they had started. Consols had the rare experience of rising and falling 1⅛ in the same week. The realization to secure profit was, of course, inevitable; and it was, moreover, a very wholesome thing. Markets are the stronger for having been steadied. The opening on Monday was fine. Led by the gilt-edged division, which were in strong demand, markets developed very great strength. Government issues rose freely. Consols gained ⅛, and other departments participated. Business fell quieter on Tuesday, and the tone was rather more sedate. But things of the highest class were very firm, and Consols were ¼ higher for the account. Wednesday brought renewed cheerfulness, and some markets were conspicuously strong, especially Government issues. Consols advanced 1; and the other leading departments (excepting Rails) were firm. On Thursday the change came about, and the pendulum swung back in earnest. Apparently it was largely felt that the big rise was about at its summit for the present and realization was the right thing. In result, all markets had a decided set-back. Consols fell ⅛, aided thereto by gold withdrawals. Rails receded in spite of encouraging dividends, and Transatlantics were freely offered. Friday was a great day for selling (as Fridays sometimes are), and prices went down all round. Consols fell another ⅛, and stocks of all sorts closed at a loss greater or less. Saturday was less active, but almost equally flat. For the third day running, Consols fell ⅛, closing at 75¾-76¼, the same price as the previous Saturday. Markets in general were dull and weak. In the Money Market, the supply was superabundant and almost unlendable at times. Discount rates steadied in the middle of the week, but fell again later. Business in the Gas Market was more lively. Transactions were more plentiful than of late; and a large number of quotations made fair, solid advances. The general recoil from the great rise in all other markets rather affected gas; and in some instances the closing prices were not the best of the week. In Gaslight and Coke issues, the ordinary was active and strong, rising from 105½ to 107¾—a gain of 1½. In the secured issues, the preference marked 98½ to par (a rise of 1), and the debenture 72 and 72½—a rise of 1½. South Metropolitan rose 1, with business at 113½ to 115, and the debenture was ½ higher at 72¾. In Commercials, the 4 per cent. made 108½ and 109, and the 3½ per cent. 107½ (a rise of 1 in each), and the debenture was done at 73. Among the Suburban and Provincial groups, Brentford old realized 267½, ditto new 208 (a rise of 3), British 45 and 45¾ (a rise of ¼), Ilford 152½, South Suburban 117 and 118½ (a rise of ½), Wandsworth "B" 134, and (on the local Exchanges) Newcastle 102 and Liverpool "A" 211—a rise of 1 in each. In the Continental Companies, Imperial changed hands at 175½ to 178 (a rise of 1), Union at 80½ and 81, ditto preference at 119 and 120 (a rise of 2), and European at 17½ to 18—a rise of ½. Among the undertakings of the remoter world, Bombay marked 6 5/16, Buenos Ayres 91, Oriental 122 to 122¾, Primitiva 6⅜ to 6⅞ (a rise of ⅛), ditto preference 5 1/32 to 5 5/32, ditto debenture 92 and 92½, and South African 10½—a rise of ½.

OFFICIAL QUOTATIONS AT THE CLOSE OF THE WEEK.

Bank Rate (fixed January 29), 3 per cent. Last year, 5 per cent. Consols, 75¾—76¼. Previous week, 75⅞—76¼.

Issue.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.	Issue.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.	£			p.c.				£ s. d.
1,551,868	Stk.	Oct. 15	4	Alliance & Dublin Ord.	56—60	..	6 13 4	75,000	5	Dec. 11	6	Malta & Mediterranean	4⅜—4⅞	..	6 3 1
374,000	,,	Jan. 15	4	Do. 4 p.c. Deb.	78—81	..	4 18 9	250,000	100	Oct. 1	4½	Met. of Melbourne 4½ p.c. Deb.	97—99	..	4 10 11
280,000	5	Oct. 15	7½	Bombay, Ltd.	6—6½	..	5 15 5								
50,000	10	Aug. 28	15	Bourne- mouth Gas & Water 10 p.c.	28¾—29¼	..	5 2 2	541,920	20	Nov. 27	4	Monte Video, Ltd.	11⅜—12½	..	6 10 8
347,500	10	,,	7	B 7 p.c.	14½—15½	..	4 11 10	1,775,892	Stk.	July 30	4½	Newc'tle&G'tesh'd Con.	101½—102½	+1	4 7 10
75,000	10	,,	6	Pref. 6 p.c.	13½—14⅜	..	4 7 8	529,705	Stk.	Dec. 30	3½	Do. 3½ p.c. Deb.	82½—83	..	4 4 4
380,000	Stk.	Aug. 14	14	Brentford Consolidated	263—268	..	5 4 6	55,940	10	Aug. 28	7/10.6	North Middlesex 7 p.c.	12½—13½	..	5 11 5
330,000	,,	,,	11	Do. New	207—212	+3	5 3 9	300 000	Stk.	Nov. 27	8	Oriental, Ltd.	120—125	..	6 8 0
50,000	,,	,,	5	Do. 5 p.c. Pref.	111—113	..	4 8 6	60,000	5	Sept. 26	10	Ottoman, Ltd.	7⅞—8½	..	6 3 1
206,250	,,	Dec. 11	4	Do. 4 p.c. Deb.	93—95	..	4 4 3	60,000	50	Aug. 14	13	Portsea, Island B	130—133	..	4 17 9
217,380	Stk.	Aug. 28	11	Brighton & Hove Orig.	201—206	..	5 6 10	100,000	50	,,	12	Do. C	120—123	..	4 17 7
244,200	,,	,,	8	Do. A Ord. Stk.	149—152	..	5 5 3	249,980	5	Oct. 15	8	Primitiva Ord.	6½—7	+⅜	5 14 4
530,000	20	Sept. 26	12½	British	44¾—45¾	+¼	5 9 3	499,960	5	Dec. 30	5	,, 5 p.c. Pref.	5—5¼	+1/16	4 15 3
120,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb. Stk.	85—87	..	4 12 0	521,600	100	Dec. 1	4	,, 4 p.c. Deb.	92—94	..	4 5 1
245,771	Stk.	,,	4	Buenos Ayres 4 p.c. Deb.	89—91	..	4 7 11	346,198	Stk.	Dec. 30	4	River Plate 4 p.c. Deb.	87—89	..	4 9 11
100,000	10	—	—	Cape Town & Dis., Ltd.	2—3	..	—	275,000	5	Sept. 26	12	San Paulo, Ltd.	—	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	2½—4½	..	—	150,000	10	,,	6	Do. 6 p.c. Pref.	10¼—11½	..	5 5 6
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	73—78	..	5 15 5	125,000	50	Jan. 2	5	Do. 5 p.c. Deb.	48—50	..	5 0 0
157,150	Stk.	Aug. 14	5	Chester 5 p.c. Ord.	109—111	..	4 10 1	135,000	Stk.	Aug. 28	10	Sheffield A	223—225	+1	4 8 11
1,513,280	Stk.	Aug. 28	6 3/4	Commercial 4 p.c. Stk.	108—110	+1	4 19 4	209,984	,,	,,	10	Do. B	223—225	+2	4 8 11
560,000	,,	,,	6½	Do. 3½ p.c. do.	106—108	+1	4 18 9	523,500	,,	,,	10	Do. C	222—224	+2	4 9 3
475,000	,,	Dec. 11	8	Do. 3 p.c. Deb. Stk.	71—73	..	4 2 2	90,000	10	Oct. 15	7½	South African	10—11	+½	6 16 4
800,000	Stk.	,,	4½	Continental Union, Ltd.	79—82	..	5 9 9	6,429,895	Stk.	Aug. 14	5/9/4	South Met., 4 p.c. Ord.	113—115	+1	4 15 0
200,000	,,	,,	7	Do. 7 p.c. Pref.	117—122	+2	5 14 9	1,895,445	,,	Jan. 15	3	Do. 3 p.c. Deb.	72—74	+½	4 1 1
492,270	Stk.	—	3 3/4	Derby Con. Stk.	123—125	..	4 12 0	209,820	Stk.	Aug. 14	8½	South Shields Con. Stk.	159—161	+2	5 5 7
55,000	,,	—	4	Do. Deb. Stk.	102—104	..	3 16 11	952,795	Stk.	,,	6	S'th Suburb'n Ord. 5 p.c.	116½—118½	+½	5 1 3
1,002,180	10	Jan. 15	10	European, Ltd.	17A—18½	+½	5 8 1	60,000	,,	,,	5	Do. 5 p.c. Pref.	112—114	..	4 7 9
16,386,660	Stk.	Aug. 14	1/17/4	Gas- light & Coke 4 p.c. Ord.	106½—107½	+1½	4 10 6	117,058	,,	Dec. 30	5	Do. 5 p.c. Deb. Stk.	113—115	..	4 6 11
2,600,000	,,	,,	3½	3½ p.c. max.	75—78	..	4 9 9	594,740	Stk.	Nov. 13	5	Southampton Ord.	101—104	..	4 16 2
4,062,235	,,	,,	4	4 p.c. Con. Pref.	97—100	+1	4 0 0	120,000	Stk.	Aug. 14	7⅜	Tottenham District A 5 p.c.	138—141	..	5 4 7
4,674,850	,,	Dec. 11	3	Coke 3 p.c. Con. Deb.	72½—74½	+1½	4 0 6	543,940	,,	,,	5⅞	B 3½ p.c.	116—118	..	4 19 6
258,740	Stk.	Sept. 11	5	Hastings & St. L. 3½ p.c.	90—92	..	5 8 8	149,470	,,	Dec. 30	4	4 p.c. Deb.	89—91	..	4 7 11
70,000	10	Oct. 15	11	Hongkong & China, Ltd.	16⅞—17½	..	6 7 6	182,380	10	,,	5	Tuscan, Ltd.	5—6	..	8 6 8
131,000	Stk.	Sept. 11	7⅜	Ilford A and C	150—153	..	4 19 8	149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	95—97	..	5 3 1
65,780	,,	,,	6⅝	Do. B	118—120	..	5 2 1	236,476	Stk.	Aug. 14	5	Tynemouth, 5 p.c. max.	111—113	..	4 8 6
65,500	,,	Dec. 30	4	Do. 4 p.c. Deb.	89—91	..	4 7 11					Wandsworth, Wimbledon, and Epsom—			
4,940,000	Stk.	Nov. 13	9	Imperial Continental	174—179	+1	5 0 7								
1,235,000	Stk.	Aug. 14	8¼	Do. 3½ p.c. Deb. Red.	83½—85½	..	4 1 10	30,000	Stk.	Aug. 28	8⅜	Wandsworth A 5 p.c.	155—160	..	5 4 8
200,242	Stk.	Aug. 28	6½	Lea Bridge Ord. 5 p.c.	118—121	..	5 3 4	255,636	,,	,,	6¾	B 3½ p.c.	132—137	..	5 0 4
561,000	Stk.	,,	10	Liverpool United A	210—212	+1	4 14 4	108,075	,,	,,	5/17/3	C 3½ p.c.	112—117	..	5 0 3
718,100	,,	,,	7	Do. B	145—147	..	4 15 3	352,000	,,	,,	6½	Wimbledon 5 p.c.	111—116	..	5 5 7
306,083	,,	Dec. 30	4	Do. Deb. Stk.	95—97	..	4 2 6	98,000	,,	,,	6⅝	Epsom 5 p.c.	115—120	..	5 10 5
63,480	Stk.	Dec. 30	3	Maidstone 3 p.c. Deb.	65—67	..	4 9 7	88,416	,,	Dec. 30	3	3 p.c. Deb. Stk.	70—72	+2	4 3 4

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

CLERK OF WORKS. Ossett Gas Department.
COAL REPRESENTATIVES. No. 5844.
CHARGE OF ESTIMATING OFFICE. Ashmore, Benson, Pease, and Co., Stockton-on-Tees.
JUNIOR CLERKS. No. 5845.
STOKER. Chepstow Gas Company.

Books Wanted.

CRIPPS' GUIDE-FRAMING OF GASHOLDERS. No. 5840.

Gas-Works Wanted.

"D. G.," 13, South Molton Street, W.

Plants, &c. (Second-Hand), for Sale.

EXHAUSTER. Great Grimsby Gas Company.
RETORTS. Cork Gas Company.

Plant, &c. (Second-Hand), Wanted.

CONDENSERS. No. 5842.

Company Meetings.

BARNET GAS AND WATER. Holborn Restaurant. Feb. 25. 12.30.
BRENTFORD GAS. St. Ermin's Hotel. Feb. 13. 2.30.
CHICHESTER GAS. Gas-Works. Feb. 24. One o'clock.
HORNSEY GAS. 63, Chancery Lane. Feb. 27. 3.30.
NORTH MIDDLESEX GAS. 5, Great Winchester Street, E.C. Feb. 23. 2.30.
RIDDINGS GAS. 139, Cannon Street, E.C. Feb. 25. Three o'clock.
SOUTHGATE GAS. 5, Great Winchester Street, E.C. Feb. 26. 3.45.

Sales of Stocks and Shares.

BOURNEMOUTH GAS AND WATER COMPANY. London Mart. Feb. 24.
HARROW GAS COMPANY. London Mart. March 3.
NEWCASTLE-ON-TYNE GAS CO. By Tender. Feb. 17.
SOUTH-WEST SUBURBAN WATER COMPANY. London MART. March 3.

TENDERS FOR

Coal.

LANCASTER GAS DEPARTMENT. Tenders by Feb. 14.
SOUTH STAFFORDSHIRE WATER CO. Tenders by Feb. 12.

Condensers.

RHYL GAS DEPARTMENT. Tenders by Feb. 25.
SHEFFIELD GAS COMPANY. Tenders by March 3.

Cookers.

BARROW CORPORATION. Tenders by Feb. 17.
DEVONPORT GAS DEPARTMENT. Tenders by Feb. 21.

Fire-Clay Goods.

BARROW CORPORATION. Tenders by Feb. 17.

General Stores (Asbestos Goods, Compo. Pipe, Lead, Cocks, Oils, Paints, &c., Steel and Iron Goods, Sulphuric Acid, Brass Fittings, Ironmongery, Tools, &c., &c.).

BARROW CORPORATION. Tenders by Feb. 17.
DEVONPORT GAS DEPARTMENT. Tenders by Feb. 21.
NELSON GAS DEPARTMENT. Tenders by Feb. 17.
OSSETT CORPORATION. Tenders by Feb. 21.

Lighting Goods.

CALCUTTA CORPORATION. Tenders by March 23.
DEVONPORT GAS DEPARTMENT. Tenders by Feb. 21.
DUBLIN CORPORATION. Tenders by Feb. 16.
WALTHAMSTOW U.D.C. Tenders by Feb. 25.

Meters.

BARROW CORPORATION. Tenders by Feb. 17.
DEVONPORT GAS DEPARTMENT. Tenders by Feb. 21.
RHYL GAS DEPARTMENT. Tenders by Feb. 25.

Pipes.

BARROW CORPORATION. Tenders by Feb. 17.
DEVONPORT GAS DEPARTMENT. Tenders by Feb. 21.

Purifiers, &c.

ROCHDALE GAS DEPARTMENT. Tenders by Feb. 25.

Retort Settings and Ironwork.

CLONMEL GAS DEPARTMENT. Tenders by Feb. 25.

Sulphate of Ammonia Plant.

NELSON GAS DEPARTMENT. Tenders by Feb. 17.

Tank.

DARLINGTON CORPORATION. Tenders by Feb. 20.

Tar and Liquor.

DEWSBURY CORPORATION. Tenders by Feb. 14.
HAWORTH URBAN COUNCIL. Tenders by Feb. 21.
NELSON GAS DEPARTMENT. Tenders by Feb. 17.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

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GAS LIGHTING ENGINEERS AND CONTRACTORS,
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Telegrams: "DACOLIGHT LONDON." Telephone: 2336 HOLBORN.

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See Illustrated Advertisement on p. 394.

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